RECONCILING THE DISCURSIVE AND THE MATERIAL DIMENSIONS OF SOCIAL STABILITY AND SOCIAL CHANGE: A CRITICAL RETHEORISATION AND NON-SYNCRETIC SYNTHESIS OF BHASKAR, FOUCAULT, AND ALTHUSSER

by

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Abstract

Sociological explanations for human conduct usually place major ontological and epistemological emphasis upon either discursive or material relations without ever establishing or adequately specifying the validity of this dichotomy. Early texts by the Critical Realist philosopher Roy Bhaskar address this forced separation by creating an integrated ontological and epistemological field that provides a more detailed and precise theoretical ordering to agents, objects, and entities. Undertaking a developmental critique of Bhaskar’s arguments, this thesis extends Critical Realism’s role as theoretical ‘underlabourer’ and creates an expanded theoretical framework that balances discursive and material accounts. Utilising the sophisticated analyses of the structure and operation of discourses found in the work of Michel Foucault alongside the innovative arguments for aleatory materialism developed by Louis Althusser, a critique is established that shows discursive, material, and social relations to be complex, immanent, and, importantly, mutually constitutive. In each theory three core concepts of events, emergence, and the extra-discursive are shown to not only be present but also to operate as the main means of explaining social change. The result of integrating Critical Realism, Foucault, and Althusser in this sympathetic but non-syncretic form is the generation of a non-reductionist materialism combined with discursive relations. On this basis, social change is shown to be the result of restructured discursive and material relations of which human agents are only one part. The thesis provides an illustration of the theoretical argument with an empirical component which examines the formation and decline of the British nuclear industry between its inception in the early 1950s to the year 2000. The conclusion is that the form taken by nuclear energy is not entirely determined by any single one of political, economic, or scientific forces but is, instead, the product of
multiple and complex interactions of immanent discursive and material relations that are, importantly, mutually reinforcing.
Acknowledgements

As an undergraduate I used to skip the acknowledgements thinking them an unnecessary delay to reaching the content of a book or article; now they are one of the first things that I turn to. An academic work is never a thing individually produced. Indeed, it is usually a humbling experience and much of that is due to the insights and commentary from others that then become indispensible to the author.

My first and deepest thanks go to Prof. Frank Pearce. When I had the concept in my head of the ideal PhD supervisor, I was unwittingly already thinking of Frank. His guidance in thinking and writing theoretically, his intellectual rigour, and his camaraderie have influenced me in so many ways I do now know where to begin in thanking him. Memories of the weekly Thursday morning meetings in his office will always remain among the most cherished of my PhD experience. I could not have asked for a better supervisor. (Although, tallying things up, I believe that he still owes me some coffees!)

My two other main PhD committee members, Prof. Richard Day and Prof. Vinny Mosco, were happy to accommodate lengthy conversations and frequent drop-ins. Both of them continually and constructively challenged me in different directions and my arguments are stronger because of it. I am privileged that they agreed to be involved in my dissertation. My thanks also go to Prof. Grant Amyot, my internal-external examiner at Queen’s, and Prof. Garry Potter, my external examiner. Their incisive interrogation during the defence, and their generous feedback afterward, is deeply appreciated.

Wendy Schuler, Michelle Ellis, Anne Henderson, and—from back in the day—Lynne O’Malley were all excellent in helping with the myriad administrative tasks that come with being a graduate student and a Teaching Fellow. They made a big difference to my experience at Queen’s.

Being a PhD student would not be possible without the support and friendship of other, similar, fellow sufferers. In this respect, I was doubly fortunate in being able to maintain a foot in both the Sociology and the Politics departments at Queen’s. My MacCorry C503 officemates, Melissa Houghtaling and Andrew Stevens, were constant fun to work alongside. Dimitrios Panagos, Scott Matthews, and Laura Kelly were continual pillars of support. Marcel Nelson, Siobhan Byrne, Emmett Macfarlane, Anna Drake, and Dean Curran were always ready with a quick quip or an insightful comment over a drink. Ronjon Paul Datta has been a friend and intellectual sparring partner since my first weeks at Queen’s. Mid-week evenings still remind me of TAing for his theory class: “Theory Wednesday’s” they will forever remain. And in 2009 I was fortunate enough to find myself on the same conference panel as Dave Elder-Vass. In equal measure, his insightful comments and wry humour have been greatly appreciated over the subsequent years.

The endurance of Mira Bachvarova, my partner, to suffer through many a social theory analysis is the reason why I was able to finish this PhD. I cannot convey to you the relief it’s been having another theorist to talk to. And with regard to our arguments about social and political theory, I warn you: I’ve just upped my game—now I might even be able to win one.

This thesis is dedicated to my family, who have been unstinting in their support. Watching their son/brother fly off to Canada must have been a relief/joy/further delay in repayment of loans [delete as appropriate] but, despite the distance, I never once felt alone. Now, come and visit!
Statement of Originality

(Required only for Division IV Ph.D.)

I hereby certify that all of the work described within this thesis is the original work of the author. Any published (or unpublished) ideas and/or techniques from the work of others are fully acknowledged in accordance with the standard referencing practices.

Sections of chapters 2, 4, 5, and 7 appear in:

(Nicholas James Hardy)

(September, 2012)
<table>
<thead>
<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>AEA</td>
<td>Atomic Energy Authority (UK)</td>
</tr>
<tr>
<td>AGR</td>
<td>Advanced Gas-Cooled Reactor (second generation British reactor)</td>
</tr>
<tr>
<td>AK</td>
<td>Archaeology of Knowledge (Foucault)</td>
</tr>
<tr>
<td>BC</td>
<td>Birth of the Clinic (Foucault)</td>
</tr>
<tr>
<td>BNFL</td>
<td>British Nuclear Fuels Ltd.</td>
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<tr>
<td>BNI</td>
<td>British Nuclear Industry</td>
</tr>
<tr>
<td>BWR</td>
<td>Boiling Water Reactor (one of two forms of LWR)</td>
</tr>
<tr>
<td>CANDU</td>
<td>Canadian Deuterium Reactor (a form of heavy water reactor)</td>
</tr>
<tr>
<td>CEGB</td>
<td>(UK) Central Electricity Generating Board</td>
</tr>
<tr>
<td>DP</td>
<td>Discipline and Punish (Foucault)</td>
</tr>
<tr>
<td>FBR</td>
<td>Fast Breeder Reactor</td>
</tr>
<tr>
<td>FM</td>
<td>For Marx (Althusser)</td>
</tr>
<tr>
<td>HM</td>
<td>History of Madness (Foucault)</td>
</tr>
<tr>
<td>HS1</td>
<td>History of Sexuality, Volume 1 (Foucault)</td>
</tr>
<tr>
<td>HTR</td>
<td>High Temperature Reactor</td>
</tr>
<tr>
<td>LWR</td>
<td>Light Water Reactor (has two forms: BWR and PWR)</td>
</tr>
<tr>
<td>Magnox</td>
<td>First generation British reactor (named after the magnesium oxide cladding around the fuel)</td>
</tr>
<tr>
<td>Mox</td>
<td>Mixed-oxide</td>
</tr>
<tr>
<td>MRH</td>
<td>Marx’s Relation to Hegel (Althusser)</td>
</tr>
<tr>
<td>NGH</td>
<td>Nietzsche, Genealogy, History (Foucault)</td>
</tr>
<tr>
<td>NI</td>
<td>Nuclear Industry</td>
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<tr>
<td>OT</td>
<td>Order of Things (Foucault)</td>
</tr>
<tr>
<td>PN</td>
<td>The Possibility of Naturalism (Bhaskar)</td>
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<tr>
<td>PSPS</td>
<td>Philosophy and the Spontaneous Philosophy of the Scientists (Althusser)</td>
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<tr>
<td>PWR</td>
<td>Pressurised Water Reactor (one of two forms of LWR)</td>
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<td>QM</td>
<td>Questions of Method (Foucault)</td>
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<tr>
<td>RC</td>
<td>Reading Capital (Althusser)</td>
</tr>
<tr>
<td>RTS</td>
<td>A Realist Theory of Science (Bhaskar)</td>
</tr>
<tr>
<td>SGHWR</td>
<td>Steam Generating Heavy Water Reactor</td>
</tr>
<tr>
<td>THORP</td>
<td>Thermal Oxide Reprocessing Plant</td>
</tr>
<tr>
<td>TP</td>
<td>Theatrum Philosophicum (Foucault)</td>
</tr>
<tr>
<td>UCME</td>
<td>Underground Current of the Materialism of the Encounter (Althusser)</td>
</tr>
<tr>
<td>USNI</td>
<td>United States Nuclear Industry</td>
</tr>
</tbody>
</table>
Interviewees

Anonymous  Journalist and writer
Ted Benton  Academic, University of Essex, and environmental campaigner
Paul Brown  Journalist, writer, and academic
Tom Burke  Consultant, former Ministerial adviser, and former Friends of the Earth campaigner
Hannah Chambers  Activist and campaigner
Kate Hudson  Head of CND, and academic
Gueorgui Kastchiev  Academic, University of Natural Resources and Life Sciences, Vienna, former Chair of the Bulgarian Official Committee on the Peaceful Uses of Nuclear Energy
Mike Koroni  Activist and campaigner
Gordon MacKerron  Academic, Science and Policy Research Unit, Sussex University
Alastair Mackie  Air Commodore (Ret.), Vice-President of CND
Walt Patterson  Nuclear physicist, former Friends of the Earth Campaigner
Keith Parker  Head of UK Nuclear Industry Association
Hugh Richards  Anti-nuclear campaigner
Karmen Thomas  Former Greenham Common activist, and social campaigner
William Walker  Academic, Edinburgh University
Peter Wilkinson  Consultant, former Greenpeace (UK) Director
Brian Wynne  Academic, University of Lancaster

I would like to express my sadness at the death of Hugh Richards on 27th August, 2010. His command of the minutiae of all things related to nuclear energy—especially the third generation PWR reactors—was nothing short of extraordinary. His death is a very sad loss.
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Introduction

This thesis offers a theory of social change, developed through a series of critical engagements with the theoretical perspectives of critical realism, Louis Althusser, and Michel Foucault. The aim is to move beyond the largely dichotomous accounts of social change found in sociology that understand it to result from either material or discursive forces. By interrogating the theoretically sophisticated work produced by critical realism, Althusser, and Foucault, a sympathetic yet non-syncretic integration can be made that retains core insights whilst overcoming problematic assumptions and lacunae. The result of this integration is the development of a theoretical position that combines a non-reductionist materialism alongside an account of discourse that rejects human agents as possessing any form of Kantian transcendent subjectivity. Instead, by focusing more heavily on these ontological and epistemological concerns, a stronger argument can be made for the immanent and mutually constitutive relation between material and social forces. The argument that there is a link between material and social relations is, of course, not new; what is new, however, and is the primary contribution of the thesis, is the argument made regarding the material and the discursive that privileges neither one nor the other in their relationship.

This introductory chapter begins with an outline of examples of social theory, before moving on to examining what a ‘complex social object’ can be understood to be. This includes a brief discussion (followed up again in Chapter 1) of how the nuclear industry can be understood to be an example of a complex social object. The chapter then covers examples of both empirical and theoretical works that demonstrate the
connection—and major differences—between the two forms of inquiry. The chapter concludes with an overview of the wider chapter structure of the dissertation.

Social Theory and the Social World
Theoretical explanation
In Social Theory as Science, Keat and Urry (1975: 1) argue that social science continually battles an internal dichotomy where positivism and naturalism are opposed to idealism and anti-naturalism. Hindess (1977: 4-8) cites this tension as a result of the realisation that neither solely epistemological (positivist) nor solely ontological (idealist/rationalist) accounts can produce adequate explanations for complex events. However, while there is an inherent opposition between positivism and idealism, Keat and Urry argue that there is no need for such antagonism to exist with regard to naturalism.¹ Rejecting the positivist hijacking of naturalism, realist accounts continue to engage with the concept of a real and external world, yet stop short at claiming full knowledge of that world. For the realist, Keat and Urry argue, “adequate causal explanations require the discovery both of [Humean] regular relations between phenomena, and of some kind of mechanism that links them” (ibid.: 30, emphasis added). The interrogation of the world requires empirical experience, but in order to explain experience there is a requirement to account for factors that are necessarily unobservable. Theoretical argument, therefore, is catapulted into a position of key importance: as neither empirical observation nor idealist rationalisation can adequately explain the formation and operation of the world, providing an empirically and theoretically integrated account becomes a hugely important task.

¹ A point taken up in Chapter 2 with regard to Bhaskar.
Implicit within empirical/positivist arguments and explicit within idealist/rationalist arguments is the use of theory. Empiricists undersell (or, at worst, deny) the theoretical content of their research, while idealists overstate the ability of their argument to account for the social world (and sometimes even the physical world, e.g. Hegel). To overcome these constraints there emerges, what Keat and Urry (1975: 217) call, an emphasis on “the relations between language and reality” (Keat and Urry, 1975: 217). This involves the explicit recognition that there is a need to formulate abstract concepts and to construct a coherent relationship between those concepts. This relation between concepts is what Hindess and Keat and Urry term ‘theory’.

Woodiwiss (1990) provides one of the most articulate and accessible accounts of what social ‘theory’ might be understood to be. Since Ferdinand de Saussure established that words are not essentially linked to objects but are, instead, interlinked amongst themselves as part of a wider system of language, the idea that the human constructions of knowledge accurately reflect the external world has been, at best, under severe tension (ibid.: 3). If a theorist is to undertake the production of ‘theory’ with any kind of seriousness, then an important distinction must be maintained “between ‘the analytic’ or the conceptual and ‘the concrete’ or the empirical” (ibid.: 7). Woodiwiss elucidates this point further:

The proper conception of theory is, then, not [NH] one that considers concepts to be stable representations of the extra-theoretical world and its ‘inner-workings’. Rather, it is one that considers concepts to be inherited but inherently changeable and irredeemably abstract signs, which to a degree and because of their semiological character, are manipulable without any necessary reference to the extra-theoretical world. Nevertheless, as social scientific signs they are and/or should be made to illuminate or refer to that world in an explicit and visible way… (ibid.: 8, emphasis in original except for ‘NH’).

The construction of theory necessarily involves the creation of abstractions that are always representations (i.e. approximations) of what is thought to concretely exist. For
Woodiwiss, social theorists must “aim to provide not pictures of social reality but rigorously interrelated ensembles of signs that have been made to refer to extra-theoretical reality” (ibid.: 9). This means that social theory must construct approximations of reality, while realising that reality is distinct, independent, and has no regard for theoretical thought *per se*. As Althusser recounts from Spinoza (1967/1990: 228), the *idea* of a circle is not the circle, the *concept* of a dog does not bark—in short one must not confuse the concept and the real thing. Or, from a reversed position, the real-concrete does not ‘need’ the theoretical-abstract in order to exist: to quote Sprinker (1987: 275), “apes have opposable thumbs without having a concept for them.” It is through theory and knowledge-constructs that the world becomes intelligible to humans, but the world does not require intelligibility in order to operate (e.g. see: Lopez and Potter, 2001).

It is precisely this independence of the world vis-à-vis thought of the world that poses such a danger to theoretical accounts. If the distinction between abstract theoretical concepts and the concrete actual world is lost, then it is likely reification will occur. When an object is reified, the theoretical concept used to represent it in thought is mistakenly understood—or sometimes even wilfully assumed—to accurately represent the features or properties of that concrete object. The reification process is not restricted to abstractions about the concrete, it can also occur when wholly abstract concepts are deemed to exist as concrete entities, relations, structures, etc. For the theorist, therefore, continuous recognition must be maintained that the conceptual

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2 As discussed in Chapter 3 some accounts, such as Hegel’s, attempt to move beyond this distinction by arguing that while there might be at first a discrepancy between abstract-concept and concrete-object, through dialectical engagement increasing levels of abstract knowledge are generated about the concrete thing until full correspondence exists between the two (the ‘thing-in-itself’ becomes a ‘thing-for-us’). The problems with assumptions such as these are discussed in detail in the chapter.
abstractions produced as part of their theory are necessarily separate from the concrete world—including all of the problems that this produces regarding the ‘explanation’ of that world. This disparity between the ‘object in thought’ and the ‘object concrete’ cannot be avoided (see: Althusser and Balibar, 1968/2006: 40-43, 189-93; Hindess, 1977: 193, 205-7). Bhaskar makes the point that past a certain point theory is “irreducible and mutable” (1978/2008: 187), i.e. that theory is necessary, contains a necessary level of complexity, and is liable to change.

For the social theorist, then, the task is to attempt to account for the social world through a series of interrelated conceptual abstractions. The rigour that social theory requires is threefold: the first is to abstract from the everyday, the second is the development of well defined concepts, the third is the reapplication of the theory to the world-as-it-is. Indeed, as Sayer (1981/1998: 135) argues, this is the benefit of theoretical analysis: it is not simply the production of abstractions, but the analysis of their interrelation between component parts. This, for example, was Marx’s method in Capital:

The physicist either observes natural processes where they occur in their most significant form, and are least affected by disturbing influences, or, wherever possible, he makes experiments under conditions which ensure that the process will occur in its pure state. What I have to examine in this work is the capitalist mode of production, and the relations of production and forms of intercourse that correspond to it. Until now, their locus classicus has been England. This is the reason why England is used as the main illustration of the theoretical developments I make (1867/1990: 90).

Marx’s specific use of English capitalism (or more correctly, ‘British capitalism’, for Scotland was included as well) and not, for example, German or French capitalism is precisely because Marx was looking for some of the ‘purest’ concrete instances. Britain provided him with these because industrial capitalism was unfettered by external competition while it formed into a set of systemic and repetitive relations. Despite developing his abstract theory from concrete examples, Marx neither argued that
abstract capitalism ‘operated’ in a distinctly British way, nor did he argue that all concrete capitalism operates according to abstract principles. Instead, Marx abstracted from the concrete, established abstract concepts and principles, and then argued that each individual capitalist system would operate differently but largely according to those principles. Indeed—and in an important aspect covered in Chapter’s 2 and 3—Marx only argued that there are tendencies in operation, not ‘laws’ or ‘powers’. In the abstract capitalism operates in a particular way, but in the concrete it operates through a multitude of different forms, structures, and relations that continually alter these tendencies.

Complex social objects
Marx’s examination of British capitalism serves as a good case in point regarding the objects of theoretical investigation. The task facing a social theorist is made easier, but also at the same time more treacherous, in analysing social objects compared to natural objects. This strange—and somewhat contentious—comment is discussed in more depth in Chapter 2. However, for the moment, attention should be drawn to what Bhaskar terms the “intransitive” and “transitive objects of knowledge” (1978/2008: 21; see also Outhwaite, 1983: 115). Intransitive objects are the things that theory examines—for Bhaskar these are the objects that would continue to exist if humans ceased to exist. Transitive objects of knowledge, meanwhile, are the “Aristotelian material causes,” things that require human endeavour to create and maintain their existence—this includes knowledge, values, artefacts, etc. (ibid.). We might also include social objects in this category. If humans ceased to exist, there would be no capitalism; but this is not to reduce capitalism merely to human interaction (as will be discussed in Chapters 2 and 3). The problem facing the social theorist is the difference between
intransitive objects (such as hydrogen atoms, or lava) and transitive objects (such as *knowledge* of hydrogen or lava).

The first task facing the social theorist, therefore, is to have concern over the type of object under examination and the theoretical resources available to conceptualise it in the first place (discussed in Chapter 2 and 4). Although somewhat easier to initially conceptualise compared to natural objects, *social* objects have an added difficulty that their form can radically change both within a society and between societies. Marx’s focus on the emergence of capitalism, for instance, did not analyse the whole of European capitalism but just one example (British) and used that to extrapolate generalised theoretical concepts. Now, of course, generalisations from specific instances should only be made with the utmost care—and certainly Marx’s argument (as noted above) was *not* that “all industrial capitalism is British.” Instead Marx critiqued the political economy of the time (*a la* Smith, Ricardo, and Mill), radically altering it to account for the differences in his analysis of the concrete compared to the existing abstract accounts. That is, he not only argued that political economy was reifying (from the abstract to the concrete) human economic relations, but also that the existing reified abstractions were not even that good—the discrepancy between the British industrial capitalism ‘as it existed on the ground’ was very different from the theory, the political economy, that was ‘meant to explain it.’

Apart from the deceptive complexity inherent in social objects, the second difficulty facing social theory comes from what, as Outhwaite argues (1983: 154), is the mutually constitutive ontological form of society:

Society [is] both a condition and a continuously reproduced outcome of action. …Such a definition [of society] is therefore distinct from ordinary usage, in the sense that [the definition] may involve abstract theoretical concepts, and yet it is
likely at the same time to be linked in complex ways to our contemporary and 
historical experience of sociality.

This means that the social theorist is placed within a particular set of tensions. At one 
and the same time, their task is to study a social object that (a) might form part of the 
necessary preconditions for the existence of both the theorist and the study itself; and (b) 
is continuously being reconstituted through human action, i.e. that the object itself is 
constantly being remade at the same time as the theorist is examining it. This is, of 
course, of great concern for it could be the case that the object under study does, in fact, 
change marginally or considerably while under examination. If this is true, can it even be 
said to be the same object? This is discussed in more depth in Chapters 2, 3 and 5, but 
for now the position at least can be postulated that both the effects and the form of an 
object can be understood to constitute two forms of continuity. As the discussion of 
Althusser covers in Chapter 3, a structure may change but the effects that it produces 
endure: creating continuity through effect(s). As covered in Chapters 3, 4, and 5, 
structural forms may endure with little or no change to them (although their effects may 
not necessarily endure along with them): this is continuity through structural form. One 
of the arguments in this thesis is that the effects and form of social structures are 
constricted—or as the thesis will argue, ‘partially determined’—by the material elements 
contained within them and that surround them. Social objects, alongside their naturally 
occurring counterparts, should be viewed to have an ‘existence’ because they have both 
identifiable component parts and because they have identifiable effects. The elaboration 
of this point is the wider work of the thesis.

Taking the arguments of Keat and Urry (1975), Hindess (1977), Benton (1977), 
and Outhwaite (1983) seriously, sociology has not yet formulated an appropriate answer 
to the problems raised by the over emphasis upon epistemological empiricism and
ontological idealism/rationalism. The realist position alluded to above, so far most
convincingly outlined by Bhaskar (1978/2008), offers a subtle and detailed alternative to
being caught between the two other methodological monoliths.

The nuclear industry as a social object
Chapter 1 outlines the history of the British nuclear industry (BNI) and Chapter 7 offers a
theoretical reassessment. However, the BNI deserves a brief discussion here because it
is the social object which illustrates the theoretical position developed by this thesis. The
BNI is an interesting example for several reasons. The first is that it has a definite start
date: the end of World War Two. The development of controlled atomic fission was a
huge scientific breakthrough and, as Chapter 2 argues, it was expected that this
achievement would bring an abundance of energy that was virtually costless. As shall be
seen, however, this did not prove to be the case. Second, and developing from the first
point, the nuclear industry is a relatively clear object to define. In relation to the nuclear
industry, nothing existed prior to the development of nuclear energy post-World War
Two. There is a clearly identifiable form of a civil nuclear industry, as outlined in Chapter
1, that can be outlined and analysed.

Third, along with the chemical and bio-technology industries there is arguably no
other human endeavour that contains such dangers as a necessary part of its operation.
Of course, many things may at some point rise to a dangerous level—something like
capitalism (to continue Marx’s point), for instance, can quite easily consume everything in
the search for short-term profit at the expense of long-term futures. But, importantly, this
takes time. The nuclear, chemical, and bio-tech industries are especially notable in their
potential for catastrophic accidents that have immediate and wide-ranging effects. The
chemical disaster at Bhopal, India (see Pearce and Tombs, 1998) seriously affected
humans, animals, and the environment in such a way that it is largely comparable to the effects of warfare (i.e. the loss of life and destruction to the environment). The catastrophic failure of safety systems at Japan’s Fukushima Dai-Ichi reactor in March 2011 after a huge tsunami struck the plant was listed in late 2011 as surpassing even the 1986 Chernobyl disaster for the amount of radionuclides released. The potential for disaster, therefore, is huge. As Prof. Brian Wynne (2009) stated in an interview for this thesis:

As a nuclear industry friend said a few years ago, ...if the 9/11 [terrorist attack] had happened at Sellafield [Britain’s largest nuclear facility], we’d be talking about not just the evacuation of North-West England, but the evacuation of North-West Europe. There is 75 metric tons of uranium and plutonium—at weapons grade—in store on the surface at Sellafield.

Fourth, the BNI is arguably one of the most rapid, focused, and single-minded scientific endeavours ever undertaken. As a social, political, and economic project, therefore, it is not unreasonable to assume it was a prime example of well-integrated and optimal social structures. Yet based upon empirical accounts it would appear that soon after coming into existence the BNI became largely unorganised and, at times, highly dysfunctional. To follow Glynos and Howarth (2007: 11) and Foucault’s (1984/2003a) argument, there have been many problems with the BNI yet, apparently, few actions taken to address them. Why was this the case when it was such an important venture?

Finally, and linked to the preceding point, the nuclear industry is an example of a social object that is heavily constrained by the ‘materiality’ of radionuclides, the waste it produces, and the long-term effects it creates. These are so powerful that social and political activity are, at best, severely constrained—at worst, they are almost fully
determined. The 1957 Windscale fire, Three Mile Island, Chernobyl, and now Fukushima stand as a warning for when those requirements are not met.

**Methodology**

**Theoretical**

The largest part of the methodology employed for the research contained in this thesis was in regard to theory. There is a small, but not insubstantial, component of empirical research consisting of archival work and a number of interviews conducted with different specialists. Both of these are covered in turn below.

There is no clear methodological guide to what it is that theorists ‘do’ when they theorise. Much attention is paid to how to theoretically inform research, but scant regard appears to be paid to ‘how’ to undertake the process of theorising. To draw a comparison, a positivist, and therefore a highly empirical researcher, has a wide range of sources on both the methods and the reasons why positivist research should be carried out in a particular way (i.e. both an epistemology and an ontology). In contrast, while theory is usually quite ontologically dense while attention has been given to questions concerning the ontology of why a particular theoretical position does or does not produce particular results, almost nothing has been said about how a theorist might go about ‘doing theory’.

However, one clear effort has been made by Pearce (2001), Woodiwiss (1990), and Hindess (1977) who build upon the work of Althusser (1968/2007). Woodiwiss’ definition of theory was outlined above as an example of what social theory should attempt to be. This position is very similar to that outlined by Hindess (1977: 223-8),

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3 Of course, choice is always available: but the repercussions from not adequately maintaining nuclear materials are devastating.
Pearce (2001: 4-8), and Althusser (1968/2006). Each with a slightly different emphasis, all four outline how a theorist can undertake the ‘process’ of theorising. There is a danger that this question may seem slightly trite: is it really that hard to theorise? As should hopefully be clear at this point, theory is not just ‘thought per se’. Undertaking theoretical work necessarily requires the development of precise conceptualisations of concrete and/or theoretical objects. Theory, therefore, builds itself in two distinct ways.

The first builds theory from existing concrete objects (unless, that is, the theorist is willing to fall into idealism⁴). Theorising from concrete objects necessarily involves some level of empirical analysis: for how would one claim an object is concrete if there is not some form of observable existence? (The question of ‘real’ but ‘unobservable’ entities is covered below.) Empirical accounts are, therefore, observational accounts generated from either primary or secondary sources. From these observational accounts (which, of course, entail some use of pre-existing theoretical assumptions), the theorist generates abstract concepts that are used to ‘represent the concrete object in thought’. And unless there is reasoned call for them not to, these abstractions should hold constant throughout the theory.

The second is the development of wholly abstract concepts—i.e. concepts with no observable empirical referent. This is a key component in the process of developing social theory, but is also the point where Hume’s critique of theory/philosophy/religion comes into full force. This means extreme care must be taken in ‘assigning’ any kind of causality to a theoretical construct, or reification will likely be the result. These abstractions may have some concrete basis, such as observing workers in a factory, and it might lead to the unobservable concept of ‘class relations’ being produced (to explain

⁴ Where thought is understood to be able to partially predefine the concrete objects it engages with; again, Hegel serves as the example.
the society-wide differences in occupations, income, ownership, etc.). Alternatively the concept may be fully abstract, such as Foucault’s concept of a ‘dispositif’, which operates to reconcile destabilising conflicts.

Once constructed, both types of concept (concretely derived and abstractly derived) should work in some form of relation to one another—i.e. there should be some purpose to the act of theorising them in the first place. It is at this point that the use and development of abstract concepts takes on renewed vigour. The usual purpose for abstract concepts is to account for how a (theorised) system operates while still explaining otherwise inexplicable occurrences. This is only necessary in theoretical accounts because a concrete system, by virtue of the fact that it does operate, evidently requires nothing more in order to operate. The need for further abstract concepts indicates the lack of explanatory power presently available in a current theoretical argument.

**Empirical**
While the thesis is predominantly a theoretical analysis, the empirical component—the analysis of the BNI—provides a ‘grounding’ for the theoretical argument. It is not the purpose for the empirical data to ‘prove’ the theoretical arguments to be ‘true’; rather, the empirical research adds additional, and largely descriptive, weight to some of the arguments being made in the theoretical analysis. This may seem counterintuitive or, even worse, a form of faux research that generates nothing but malleable results that can be moulded to suit any desired conclusion. It cannot be denied that theory (necessarily) involves active ‘theorisation’ by the theorist—but if the theory follows the stern criteria set out above, then discrepancies and sleights of hand can be identified.

The empirical research to be undertaken (as outlined below) will also be held to a high
standard: the form in which it is undertaken is not simply the production of results to fit a predetermined theoretical or ideological paradigm. As shall be seen, the empirical work necessarily involves a level of triangulation (Bryman, 2004: 454-457) and saturation (Bryman and Teevan, 2005: 232; Jackson, 2003: 140-141) that greatly diminishes the possibility to skew interpretation of the data. Keeping the caveat firmly in mind that this thesis is not primarily an empirical project but is instead a theoretical one, to produce an account of the BNI adequate for the argument being made two types of empirical methods are used.

The first form of primary research was a series of semi-structured interviews undertaken with various specialist commentators. These interviews were conducted with 17 individuals spanning a range of different interests including: nuclear physicists, campaigners, academics, journalists, and interest groups. Audio recordings of each interview were made and then later transcribed. For each interview, a core set of questions was asked with sector-specific questions being used for specialised follow-ups if time remained. The questions were left open-ended and allowed respondents to answer in any way they deemed fit (e.g. positively or negatively).

The second form of primary research was archival research. Identified at an early stage, the Science and Technology Policy Research Unit (SPRU) at Sussex University near Brighton, UK, has both a library and archive consisting of a wide range of academic, governmental, and industry publications relating to, among other things, nuclear energy. Five days were spent working through relevant sections, with notes and photocopies taken of relevant documents.

Along with familiarisation of important secondary sources (many of which constitute the body of Chapter 1), both streams of empirical research reached a saturation point. When conducting the interviews, many of the answers to the core questions began to
become repetitious. This was welcome as it meant that, apart from slight variations or specialist responses, the likelihood of highly relevant knowledge being present but unknown was drastically reduced. When the interviews were later analysed and compared to both SPRU archive documents and with wider secondary sources, a high level of general agreement was present across the sources.

The results of the primary research form an important part of both the historical account given in Chapter 1, as well as the reassessment of the BNI that is conducted in Chapter 7. While not essential for the theoretical components of this thesis, the research provides an important foundation from which to begin with the empirical example.

**Chapter Structure**
The thesis is structured into the following main chapters. Chapter 1 begins with a short lay-persons’ guide to radioactivity, radionuclides, and the operation of nuclear reactors. A brief overview is then made of the British energy industry at the time nuclear power emerged as an industrial form. A ‘potted-history’ of the BNI is then outlined, detailing key aspects and developments. The chapter concludes by highlighting four main instances argued to be key to: (a) demonstrating that a nuclear industry (rather than just a military off-shoot) existed; and (b) setting back the expected/anticipated development of the BNI with huge impact to its future form.

Chapter 2 examines the arguments for Critical Realism (CR). Having established the basis of an argument supporting a theoretical re-examination of the BNI, CR is outlined as a key component of this strategy. To later act as an ontological and epistemological skeleton upon which to order the theories of Louis Althusser and Michel Foucault, CR is first outlined and then critiqued. Developed as part of this constructive critique are CR’s arguments for causality, events, emergence, and structure. Following
this a theoretical position with *prima facie* similarity to CR, Actor Network Theory, is examined before being rejected due to its insufficient ontological depth and a lack of consideration for the inherent properties of objects.

Chapter 3 develops an assessment of the work of Louis Althusser. Specifically, the chapter covers Althusser's argument for aleatory ('chance') materialism. Published posthumously—and so requiring significant theoretical development—aleatory materialism argues that it is through largely chance encounters that social and natural structures are formed. This makes it a heavily anti-teleological account of social change. Aleatory materialism is then critically linked to Althusser's wider work, the chapter querying how his earlier arguments might be retheorised to take account of this later development. In this way, Althusser's work is argued to provide a strong support for the materialist elements of CR. The chapter concludes with an argument for what should be contained as part of an integrated aleatory materialist position.

Chapter 4 is the first of two chapters which covers the work of Michel Foucault. The chapter outlines Foucault's wider methodology, which is argued to be an excellent example of what a detailed epistemological theorist can achieve. Compared to Althusser's almost exclusive ontological account, Foucault's two methodological perspectives of *archaeology* and *genealogy* are examined to outline the developments that each can bring to the analysis. Instead of seeing the two methods as being largely exclusionary to each other (as is sometimes argued) they should, the chapter argues, be understood as complementary. However, this complementarity can be achieved *only* if certain theoretical alterations are made—which is the focus of the following chapter.

Chapter 5 develops a critique of Foucault's theoretical perspective that expands three key elements of his work: events, emergence, and the extra-discursive. An argument is made that by expanding the concept of the extra-discursive—through
utilising CR to bolster Foucault's own, but hugely underdeveloped, account of the extra-discursive—his persuasive arguments for events and emergence can be developed to produce detailed and convincing accounts of both discursive and material change.

Chapter 6 works to integrate the three theories. Based upon but not limited to the three concepts of events, emergence, and the extra-discursive, the chapter uses CR as a series of theoretical and philosophical bridges through which to link Althusser and Foucault. By using the arguments and critiques developed over the preceding chapters, a syncretic analysis is avoided. This integration means Althusser and Foucault can now ‘talk’ to one another, and not just engage in a largely frustrating material/discursive opposition. The chapter concludes with two applications of the integrated position: the first is a reassessment of Foucault's account of the creation of ‘delinquency’ in the penal prison system; the second is John Campbell’s (1988) account of the demise of the US nuclear industry.

Chapter 7 brings the integrated theory back to analyse the British nuclear industry. Identified are aleatory events, social and discursive structures, and the materiality of elements and processes present within the BNI. Two important discursive structures are identified: one regarding the changes to energy that were thought likely to emerge from the BNI; the other regarding the economic gains that were meant to emerge from the BNI. The failure of the BNI both in terms of energy and economics were major blows to the credibility and operation of the BNI. Partly as a result of these failures, beginning in the 1970s major institutional reforms took place, introduced by both Conservative and Labour governments. The chapter concludes with an analysis of a neoliberal dispositif that operated to recapture the energy producing sections of the BNI (i.e. the now built and operating reactors), expunge scientific operations, turn them into purely electricity producing power stations, before then selling them to the private sector.
Chapter 1
Understanding the British Nuclear Industry as a Complex Material and Social Object

Introduction
In *The Whale and the Reactor* (1986), Langdon Winner asks the question “can technology have politics?” As an example, he draws his reader’s attention to the politics inherent in *design*. Winner cites the example of bridges on Long Island, New York; these he argues, were purposefully designed with arches too low to allow buses to pass underneath (1986: 22-3). Robert Moses, the architect who designed the roadways and the bridges, was adamant that “‘upper’ and ‘comfortable middle’ classes as he called them” could use the parks on Long Island. But anyone requiring the use of public transport—with their 12 foot high buses—would be unable to make it easily to the beaches of Long Island (ibid.).  

Winner also gives a second, and slightly different, example: that of plutonium and nuclear energy. He cites Ayers’ (1975) argument that if the US civil nuclear industry was to start producing plutonium to *trade* (for use in the ‘fast breeder reactor’, see below), there would very likely be severe knock-on threats to civil liberties. Only a year before a high profile UK report (RCEP, 1976; see further below) outlined an eerily similar position, Ayers argues that to offset the chance that plutonium could go missing—and especially if plutonium *did* go missing—the US state would be required to overturn many core civil rights. However, these two examples of ‘politics’ inherent in technology are not completely the same. Winner is conscious that there is some distinction, for he highlights two types of effect: the first are the concrete, i.e.

5 Winner’s statement sparked quite a determined response from, among others, Steve Woolgar (1991). Woolgar’s argument prompted a gouging reply from Trevor Pinch (1993), and then finally a reply from Woolgar and Cooper (1999).
actually existing, repercussions from real objects (e.g. the actual height of an existing bridge); the second is to do with abstract, i.e. potential, effects resulting from objects (e.g. the possible responses to stolen plutonium).

Winner’s attempt to develop a distinction between the different ‘politics’ that objects may have brings to the foreground an important point that this thesis will explore—albeit from a very different perspective. Winner’s argument only implicitly makes the distinction between the powers of objects and the (social) effects that they produce. “Politics” implies a reverberation in the social world, i.e. a thing has a tangible effect upon human relations. However, if the effects are generalised (i.e. what is the impact beyond just social relations) and are understood not to originate because of human agency (e.g. low bridges stopping tall buses was not the first time that physical matter was unable to pass through space occupied by other physical matter), then a radical change can be instigated in the type of theoretical inquiry it is possible to undertake. However, the social is not downgraded or excluded in this reformulation. Far from it. The social context is maintained because, as Winner correctly identified, it is through social relations that humans construct their world: through learnt knowledges, cultural value systems, and interaction humans acquire, manipulate, and utilise various material objects. To varying extents, both the material world and the social world are malleable by the other. The task of sociological investigation is to establish just how far different material and social objects are malleable—or not.

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6 Not the ‘essence’ of an object but the powers held by that object. This point is developed in Chapter 2.
Why use the nuclear industry as an object of investigation for social theory?
As discussed in the preceding chapter, the theoretical task of explaining social stability and social change rests largely upon identifying and explaining the interaction between things, entities, and objects that make up the social and material world. How this interaction manifests—e.g. harmoniously or agonistically—begins to offer the basis for explaining social stability and social change. By extending the theoretical analysis further still to include not just descriptive accounts of the events that occurred (e.g. the actual harmonious or agonistic interaction of things, objects, etc.) but to also investigate wider relations that promoted the interaction in the first place, a theorist can begin to unpick and examine if particular individual things or particular combinations of objects, etc. are responsible.

From this perspective, what makes the nuclear industry (NI) such an interesting social object for research is that it contains a combination of very ‘stubborn’ material elements (e.g. radionuclides), it requires large and precise industrial processes and sites, and it has both potentially very advantageous and very serious effects (e.g. abundant energy, toxic radiation releases, and atomic weapons). These aspects mean that, sociologically, the NI requires that social relations take its materiality into account. A corollary of this is that the NI contains a number of material processes that are largely resistant to wider social forces. For example, when dealing with radioactive materials—assuming that avoidance of human injury and/or environmental degradation are desired goals—a higher than usual structuring of social relations is required. This means there is a reduction of the possible form and type of social relations. You cannot ‘wish away’ the effects of neutron radiation upon the human body, for instance; avoidance of neutron radiation must therefore be built into social relations.
The extreme effects of radioactive elements—i.e. the properties of material elements contained in particular social relations—is just one point of interest for social theory. Another is the socio-economic aspect of the NI. It requires the mobilisation of vast amounts of social resources and, with finite resources available, quickly impacts upon other social relations that also require those resources. What gave the NI such an advantageous position in many advanced societies? The inability of the NI to deliver energy both at an appropriate cost and at the volume that it initially promised has been, as Bupp and Derian (1978) term it, “the failed promise of nuclear power.” What comes to be of sociological and political interest is how did this “promise” failed. Theoretically, then, analysing moments of both material and discursive disjuncture—i.e. periods that highlight the disjoint between rhetoric, pronouncements, and argument (‘discourse’ more generally)—sheds further light onto the specific means by which the NI was justified and legitimated. Of course, the NI is not the first industry or technology to have discursive support and backing. What makes the NI interesting is the status awarded to it in discourse, the secrecy surrounding both its development and operation, and the various counter-arguments brought against it.

None of these aspects are unique to the NI—for instance, the chemical industry can produce highly hazardous materials, the British National Health Service absorbs massive amounts of funding each year, and animal testing in clinical research is highly contested—but the NI is one of the few social objects that brings so many of these elements together in one ‘place’. So, while the effects of the elements it contains are not unique per se, the NI is unique in the particular mix/configuration that these elements consist. For instance, (a) the specific materials that it engages with (i.e. radionuclides) and their particular effects; (b) the generation of an entire industrial process from the mining to the super long-term management of radionuclides; and (c) the extremely high
level social structuring that is required to regulate the social interactions engaging with NI elements over time.

This chapter continues with a short history of the British NI. This background gives a context that will be returned to in the final main chapter, where it is re-explained using the integrated theoretical position developed in the main part of this thesis. Following this, four developments are briefly identified that unambiguously establish the existence of an independent nuclear industry (i.e. nuclear energy may be linked to the military, but it is certainly not tied to, or directed by, the military). The reason why this theoretical reassessment is necessary, the chapter concludes, is the huge discrepancy between expectation and performance that cannot be explained simply in terms of ‘the NI was destined to fail’, or that it was ‘merely’ politics/economics/scientific failure/social protest that halted its development.

1.1 A Short History of the British Nuclear Industry

The British nuclear industry (the BNI) is a contradiction: day-to-day it appears largely as a regular, mundane industry; yet it involves highly complex activities engaging with highly dangerous materials which, as such, make it quite unusual. The BNI was originally conceived as “a new industry which, as it grows, will increasingly revolutionize the conditions of human life” (Jay, 1954: x), but instead ended up becoming what one observer called “a significant factor in the industrial decline of the UK” (Patterson, 2009).

The Introduction to this thesis argued that the task is to examine what makes the ‘common sense’ object of the BNI so different when analysed theoretically. The experiential/common sense BNI is apparently a product of human ingenuity and human

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7 This thesis will focus upon Great Britain because Northern Ireland, when taken with England, Wales and Scotland together form ‘the United Kingdom’, does not contain any nuclear facilities.
endeavour. And of course, in a manner of speaking, it is. However, as this thesis will argue, the BNI is heavily determined—and restricted—by the inherent traits of the materials of which it consists and of the prevailing social structural forms that aided its creation. The historical occurrences ‘listed’ below are important because they represent social and natural conjunctures that affected the form and operation of the BNI. By outlining them in some detail, core moments can be identified not only in regard to the political and economic battles that the BNI faced/inspired, but they also give a good indication where it might be most fruitful to direct further theoretical inquiry.

What follows is a short outline of the main developments in the history of British nuclear energy, offering key dates and events that will be used later as a series of ‘hooks’ for deeper discussion. There are some instances where more depth is necessary, but generally the purpose of this outline is not to provide ‘yet another’ history of nuclear energy: the purpose of the outline is to offer context to the specific instances that will be focused upon later in the thesis. The time period covered here is from the 1930s to the year 2000, the cut-off date for this research. Much of this information comes from the excellent historical research to be found in Arnold (1992); Burn (1978); Gowing (1964); (1974a; 1974b); Lowry (1986); Patterson (1985); Pocock (1977); and Williams (1980).

1930s to 1958: Theory to practice, scientific isolation, and thermonuclear bombs
In the 1930s, Britain was one of the key places in the world to study theoretical and experimental physics. Indeed, the Cavendish Laboratory at Cambridge was possibly the world’s top physics establishment, although Paris and Copenhagen (which contained Niels Bohr’s institute) were also strong contenders. Due to increasing Nazi persecution and the encroaching threat of war, many physicists left Germany—then fled Continental
Europe at the outbreak of the war—and ended up in either Britain or the US. One such chance collaboration was at Liverpool University between Professors Otto Frisch and Rudolph Peierls. They produced what was to become known as “The Frisch-Peierls Memorandum” in early 1940. For the first time, there were accurate (although still theoretical) calculations that the mass of uranium one would need to make a bomb was in fact not several tons, but only several kilograms. Forwarded by a Navy colleague to the Admiralty, it soon ends up on Winston Churchill’s desk at the War Cabinet. This resulted in the “M.A.U.D. Committee” being formed out of the best nuclear physicists now resident in Britain—and because of the mass exodus of scientists and intellectuals from Europe, many of them were the best physicists in the world. Within one year (the end of 1941) M.A.U.D. concluded that the theoretical calculations in the Frisch-Peierls memorandum were almost entirely accurate. But it also yielded further information as to the precise physics required to manufacture a uranium bomb. A much better funded and organised directorate was then formed (codenamed ‘Tube Alloys’) that prepared to marshal resources in Britain to both test and then manufacture such a bomb.

It rapidly became clear that Britain could not sustain such an undertaking during wartime (possibly even in peacetime), so Britain reached out to the US for help. However, an earlier offer of joint research from the US to Britain had been rejected six months earlier and the US now stalled in replying, having already shot ahead in terms of its own research and equipment produced in the previous 10 months. The US finally relented and allowed British scientists (and the Continental European scientists who were part of Tube Alloys) to take part in most areas of the US project. Canada also has Tube Alloys scientists working in Montreal (who later start the Chalk River reactor). The US project now takes on mammoth proportions, with full aim now focused on the success of the Manhattan Project: to develop, test, and then use atomic weaponry. The
Manhattan Project succeeds not only in producing a uranium bomb but also in the much more technically difficult plutonium bomb. ‘Little Boy’ (uranium based) is dropped over Hiroshima and ‘Fat Man’ (plutonium based) is dropped over Nagasaki. For a few months after the war’s end some Tube Alloys members were able to stay in the US, although this changes when the US demands that any remaining scientists take US citizenship; many refuse and are required to leave the country.

To Britain’s surprise, in 1946 the US passes the McMahon Act (The Atomic Energy Act). This almost totally excludes any information, materials, research, or technology related to atomic matters being given to anyone outside of the US. Coupled with the US’s stranglehold on nearly all the world’s uranium supply (gained by buying up all the available uranium ore and advance mining contracts during the war), Britain is not in the post-war relationship with the US that Britain had expected. Desperate to achieve the status of a ‘nuclear power’—both to maintain their crumbling empire and to maintain their World status—the British embark on an independent nuclear power project. Everything is geared toward the production of an atomic bomb. Already begun in 1945, several highly important industrial sites are very quickly adapted or constructed to meet a much larger project than previously expected. The different sites include: Capenhurst, to enrich uranium; Springfields, to produce chemicals essential to many stages of the manufacturing process; Harwell (the Atomic Energy Research Establishment, under John Cockcroft), for research and testing and the de facto ‘headquarters’ of atomic research; Risely (under Christopher Hinton), for engineering and production; Windscale, the site of the plutonium ‘factories’ (i.e. the reactors to produce plutonium); and in 1951 Aldermaston (the Atomic Weapons Research Establishment, under William Penney) which was specifically focused on producing an atomic bomb (Gowing, 1974a: 179-85;
Their success was the detonation, on October 3rd 1952, of a plutonium bomb on the Monte Bello islands near the Australian coast.

Following the Monte Bello test, Britain embarked upon its first programme of commercial reactor building. Initially the idea was that the reactors would be primarily for electricity production (with plutonium for weapons as a by-product); however, these were rejected when the military demanded that the reactors be designed primarily to produce plutonium. Despite a variety of reactor types, Britain is forced to take the only viable option open to it and begin to construct graphite moderated, gas-cooled, natural uranium fuel reactors. Commissioned in 1953, the first two electricity producing ‘Magnox’ reactors (so-called because of the magnesium-oxide metal used to clad the uranium fuel) are built at Calder Hall, a site adjacent to the two ‘Windscale Piles’ that produced the plutonium for the Monte Bello bomb. Officially opened by Queen Elizabeth II in 1956, Calder Hall marks a Magnox programme that, from 1953 to 1963, saw 26 Magnox reactors commissioned (finishing construction in 1972) on 11 different sites. Nineteen fifty-four also saw Parliament pass the UK Atomic Energy Act which set up the hugely powerful Atomic Energy Authority (AEA), the body which then oversaw all the research, design, and promotion of atomic industrial and weapons research in Britain.

**1959 to 1974: The rise and fall of the Advanced Gas-cooled Reactor**

The constraints of the Magnox reactors become clear early on (they could not be run at full capacity because this caused severe corrosion to parts of the reactor; Patterson,

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8 A nuclear reactor is sometimes called a ‘pile’ in reference to the first nuclear reactor that ever went critical—i.e. sustained a chain reaction by itself—which occurred in 1943 at the University of Chicago. It was termed a ‘pile’ because it was carefully constructed with graphite bricks, each containing a small ball of uranium inside them.

9 (1953-1963) Calder Hall (4), Chapelcross (4), Berkeley (2), Bradwell (2), Hunterston ‘A’ (2), Hinkley Point ‘A’ (2), Trawsfynydd (2), Dungeness ‘A’ (2), Sizewell ‘A’ (2), Oldbury (2), Wylfa (2).
1986: 16) and attention started to turn to the choice for the next generation of reactors. At this point, however, there were increasing numbers of reactor designs as well as additional institutional actors involved in the decision making process. The AEA with its Advanced Gas-cooled Reactor, was joined by the newly formed CEGB (Central Electricity Generating Board, created in 1957), US firms with ‘Light Water Reactor’ (i.e. distilled water, not heavy water) designs, and Canadian firms (using heavy water designs). It remained unclear what design of reactor\textsuperscript{10} Britain should opt to take. It was in this context, then, that Sir Christopher Hinton, ex-Head of the Risley research establishment and a towering figure in nuclear physics, wrote an article in Dec. 1961 that stunned the BNI (Hinton, 1961). Now firmly established in his new position as Chairman of the CEGB (which had responsibilities for the wholesale provision of electricity in Britain), his Three Banks Review article\textsuperscript{11} for the first time publicly questioned both the economics and the choice of the reactor chosen to succeed the Magnox. As the CEGB was, in effect, the sole purchaser of any new reactors and given Hinton’s intimate background with the British nuclear programme, the article reverberated strongly that nothing should be taken as guaranteed.

The early 1960s were characterised by a series of messy institutional conflicts coupled with inadequate means for their reconciliation. The CEGB (under Hinton) was set on ordering a type of reactor that was commercially the most cost effective. The CEGB was therefore lobbying for adopting the CANDU reactor, despite its need for

\textsuperscript{10} Britain had several ‘domestic’ choices: further Magnox reactors; the Advanced Gas-cooled Reactor (AGR) using technologically advanced but similar principles to the Magnox design, but not even a prototype was up and running until 1963; and possibly even the Fast Breeder Reactor (FBR) which, during this time, was still in its extreme infancy. US firms were offering the two types of Light Water Reactor (LWR): Westinghouse was marketing the Pressurised Water Reactor (PWR), and General Electric was marketing the Boiling Water Reactor (BWR). The Canadian design, the Canadian Deuterium Uranium (CANDU) reactor, was also a possible option.

\textsuperscript{11} Actually entitled ‘Nuclear Power’, but published in the journal Three Banks Review (published by three commercial Scottish banks).
expensive heavy water in order to operate. The AEA was keen to promote their promising new reactor, the Advanced Gas-cooled Reactor (AGR)—which had the added benefit of also supporting British industry. There was also a small, but loud, presence of the US variations of the LWRs (from Westinghouse and General Electric).

By 1965 the choice was taken at Cabinet level to go with the AGR (Williams, 1980: 122-146). At this stage only a small AGR prototype had been running at the Windscale site for only two years, but it was believed that 'scaling up' the design would not prove much of a problem. Construction of Britain’s first two AGRs started at the end of 1965 on the ‘B’ site at Dungeness in Kent (next to the already existing Magnox ‘A’ site). Little was it suspected that Dungeness B would become a byword for industrial failure: the first reactor would not start to consistently produce electricity until 20 years later; the second reactor took even longer: 24 years. In all, six sites were chosen for a total of 14 AGRs.12

The AEA, during this time, realised that the AGR was not performing anywhere near as expected—and that the AEA had promised it would. Various on-site construction problems, along with the continual redesign of AGR schematics meant that there were no economies of scale and every AGR was built to a different design. Unsurprisingly, there were no commercial export orders for the AGR although, again, the export market had been seen as crucial to the viability of the AGR programmes success. AEA attention was already turning towards the (Westinghouse) PWR for the third reactor programme—and there already existed a strong lobby in the AEA who were committed to the PWR design.

In July 1974, the Cabinet decided to move to the SGHWR. This was significant for several reasons: first, it made explicit the failure of the AGR as a viable reactor

technology. Second, it was yet another rejection of the LWRs on offer from the US—
despite their heavy lobbying presence from both the AEA and British manufacturing
companies. Third, it signalled a commitment to British technology, albeit adapted from
experience and expertise gained from relations with Canada and the CANDU. Finally, it
opened up the ‘third programme’ of British nuclear electricity. But it was exactly the ‘leap
of faith’ that had characterised the choice of the AGR programme.

1975 to 1986: THORP, the Royal Commission, AGRs again—and Chernobyl
Thermal Oxide Reprocessing Plant: THORP
On 21st October 1975 the Daily Mirror newspaper published a front-page story headlined
“Plan to Make Britain World’s Nuclear Dustbin” (Walker, 1999: 13). The story was in
reference to BNFL’s proposal for a new reprocessing centre—the thermal oxide
reprocessing plant (THORP)—that would take spent fuel elements, disintegrate them in
various chemical baths, extract the desired radioisotopes, and then fashion new fuel
elements from the recovered uranium and either store the plutonium or use it for
weapons. The proposal was justified not only on the spent fuel from Britain’s Magnoxs
and AGRs, but also spent fuel from Japan and Germany (Walker, 1999: 12). The THORP
site was to be at Windscale, where reprocessing had been going on since the 1950s (in
order to supply the military with plutonium). In March 1976, however, in an unusual
move the government approved contracts for reprocessing to be signed before the
THORP plant had been formally approved and commissioned.

The THORP issue proved to be highly contentious. But, a big change came when
Tony Benn, Secretary of State for Energy, disclosed in the House of Commons that
BNFL had lied to him. BNFL had experienced a serious leak of radioactive material on
10th October 1976 but—not wanting to destabilise the progress of their application—did
not inform either the Environment Minister (Peter Shore) or the Energy Minister (Benn). These two government departments had responsibility for nuclear matters and were not informed until 8th December (Hansard, 1976-12-09). Benn was incandescent, calling it in his diary “an absolute scandal”—especially as he was then informed of other incidents dating back to the year before: high levels of tritium being found on the local beach, and a worker having inhaled plutonium (Benn, 1990: 687-689).\(^{13}\) Partially as a result of this deception (Williams, 1982: 12), the planning inquiry for THORP was turned, by Benn and Shore, into a much larger inquiry into the validity of reprocessing at all (although, it must be said, that Benn remained in support of it ‘in principle’ all through the process). The ‘Windscale Inquiry’ is returned to further below.

**Hinton, and the Royal Commission on Environmental Pollution**

Nineteen seventy-six also saw two significant publications. The first was Christopher Hinton’s article, *Two Decades of Nuclear Confusion*, in The New Scientist magazine; the second, and more important, was the report by the Royal Commission on Environmental Pollution on the dangers of radioactive waste. Hinton’s article was important in the same way his *Three Banks Review* article had been important: it was not only what was being said, but it was *who* he was and *what* background he had that gave his words such weight. His argument was that the three-way split in the design of reactors between the CEGB, the AEA, and the different manufacturing consortiums had made the “British record of recent years so disappointing” and had directly contributed to the “lack of success over the past 20 years” (Hinton, 1976: 201). Coming so soon after the

\(^{13}\) Benn also states that an important military link between the US and Britain was raised at the Cabinet meeting when THORP was discussed: Britain sold the US plutonium and received tritium in part exchange for it (tritium being an essential component in thermonuclear weapons) (Benn, 1990: 689).
reorganisation of British nuclear manufacturing, Hinton was both decrying the recent confusion and muddle—he compared the successes of the war and post-war projects to the confusion of recent years—and called for the installation of a single body, with a designated head to take responsibility in overseeing reactor design. Hinton concluded with:

[un]less we can have such an autocratic organisation in Britain I suggest that we should consider whether we might not save money by getting out of the business of reactor development. As one of the six engineers who was at Risely on 4 February, 1946, I am sad that the day should come when I feel that Britain ought to consider such a course (ibid.: 202).

Also published in 1976 was the sixth report of the Royal Commission on Environmental Pollution. The chairman was Sir Brian Flowers, a distinguished nuclear physicist and part-time member of the AEA Board. What was striking about the report (immediately called ‘the Flowers report’) was the lucidity with which it both conveyed complex material as well as tackling, head-on, some of the most sacred tenets of the AEA and the industry. As Patterson (1985: 42) states the Flowers report’s “most controversial findings challenged official British policy about plutonium, reprocessing, [waste,] and the fast reactor.”

The issues of plutonium and the breeder reactors were interlinked because plutonium was the fuel for breeder reactors and it is plutonium that the breeder creates during its operation (from the blanket of natural uranium). Furthermore, the worldwide sale of plutonium—the ‘plutonium economy’—had always been expected to materialise, with plutonium being traded as a fuel for the various FBRs held in the West. But as the
Flowers report made quite clear, the implications and assumptions of this were quite severe and had not been adequately considered: control of plutonium would not only have to be exerted on the *movement* of plutonium but also as to its final *destination* (RCEP: 81, 125). Furthermore, what about the obvious safety issue of what would happen in the event of an accident and corresponding plutonium release? The report also shot to pieces the projections made by the CEGB and the AEA on the desirability and viability of a FBR programme (RCEP: 197-199).

Regarding future waste and reprocessing, the Flowers report was unambiguous: “there should be no commitment to a large programme of nuclear fission power until it has been demonstrated beyond reasonable doubt that a method exists to ensure the safe containment of long-lived, highly radioactive waste for the indefinite future” (RCEP: 131). Reprocessing also came under fire. By this point, BNFL had already submitted its proposal for THORP and the Flowers report mentions the Japanese contract for fuel reprocessing, finishing with “if the British Government is prepared to sanction foreign reprocessing work for commercial reasons, it should also be prepared to accept ultimate responsibility for *all* the material, once it has been received” (RCEP: 181, emphasis added). The report was arguing that the (increased number of) radioactive by-products generated by reprocessing should *not* be shipped back to their country of origin but should remain in Britain because the risk of transportation was so great. The Flowers report gave both credence and voice to the concerns that had been raised by the doubters to nuclear energy; but also—and importantly—it didn’t rule out nuclear energy as a component of any future energy strategy.
The return of the AGR
But 1978 had already contained a shock decision. In January the Cabinet took the decision to order two further AGRs. Back in 1976, the Secretary of State for Energy, Tony Benn, had agreed to the National Nuclear Corporation’s request for a further review of the three main reactor types: SGHWR (which was scheduled to start being built in 1979), the AGR, and the PWR. The result was that the SGHWR was found, in fact, to be able to start construction no earlier than 10 years later (i.e. 1987). What had seemed a promising reactor was found to be running into major problems in the scaling-up from the prototype to a commercially sized reactor. This left the AGR, of which Britain had experience and which, by this point, had the Hunterston and Hinkley Point AGRs generating electricity—albeit nine and ten years (respectively) after construction had been started.

The PWR was listed as a (desirable) possibility because, by this point, it was argued that it was the cheapest possible reactor that could be built. However, Britain had no expertise with the PWR so all the major components would have to be imported from the US, at huge cost. (Although as Williams, 1980: 255, points out, it went almost totally unremarked that the CANDU was excluded from this assessment, despite offering very attractive attributes.) Alongside the two AGR stations, the decision was also taken to order a PWR—assuming it could meet British safety standards. By making a decision of this kind, the Cabinet effectively put a stop to a domestic British reactor programme. The accident at Three Mile Island, in March 1979, when a PWR lost its coolant and very nearly suffered a reactor meltdown was, for Benn, a vindication of his decision to

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14 Two reactors each at Heysham ‘B’ and Torness.
construct two more AGRs in the interim period whilst the PWR was under safety review (Williams, 1980: 259).\textsuperscript{15}

May 1979 saw the election of Margaret Thatcher and a Conservative government. The Conservative backing for nuclear power was quick: 10 new Westinghouse-designed PWR stations, one a year, from 1982 to 1992—subject, again, to need and safety assessments. But they kept the two AGRs that were already on order—and which were the only thing sustaining Britain’s nuclear manufacturers. It was the Sizewell nuclear site that was finally chosen for the PWR and the Sizewell B inquiry was launched in January 1983. It concluded hearings two years later in March 1985 and only finally gave its report in January 1987 (Patterson, 1985: 63; MacKerron, 1987: 1). The report, as expected, endorsed the government’s position. (Although as Patterson (1985: 57-58) points out, the PWR design chosen was one that had run into significant delays in the US: out of five proposed stations of similar design, three had been cancelled and one of the remaining two was severely behind schedule.)

Nineteen eighty-four saw the nationwide strike by the National Union of Mineworkers. With the strike officially lasting 51 weeks, nuclear electricity took on added importance. Sir Walter Marshall, having previously been given a knighthood and moved from the head of the AEA to head of the CEGB, “[was] Mrs Thatcher’s favourite: essentially because he kept the lights on during the miners strike by running the nuclear

\textsuperscript{15} Benn mentioned in a speech to the House of Commons on 2\textsuperscript{nd} December 1977: “We must recognise that when we are considering matters of such difficulty it is worth listening to everyone and that the pressures that are brought to bear are not—as is sometimes suggested—only those brought by the environmental lobby against the innocent nuclear power lobby. \textit{In my political life I have never known such a well-organised scientific, industrial and technical lobby as the nuclear power lobby. It is not so much the Friends of the Earth as what Eisenhower might have called the nuclear industrial complex of which I am aware as a Minister}” (Hansard, 02-12-1977, emphasis added; see also Lowry, 1986: 6-26).
stations absolutely flat-out and ensured that there was plenty of coal stockpiled at the coal-fired power stations” (Parker, 2009).

However, on 26th April 1986 the plutonium production reactor at Chernobyl, in Ukraine, suffered a catastrophic accident. Engineers were running a test to see if the improved emergency systems that were in place would stop an accident. Causing a general power failure that caused a huge energy spike in the reactor, a massive fire broke out in the No.4 reactor core. The heat generated by the fire collapsed the containment vessel’s roof, releasing radionuclides into the surrounding environment. The Soviet authorities didn’t report the accident until forced to: the escape of radiation was so high that the next day it was found to be on the clothing of workers at Sweden’s Forsmark nuclear reactor after they set off their own radiation detection alarms—Forsmark is over 1,000km North-West of Chernobyl. A 30km exclusion zone around Chernobyl still exists in 2012.

1987 to 2000: Privatisation, THORP, and MOX

Nuclear Electric (NE) and British Electric (BE)

Three Mile Island and Chernobyl had effectively killed-off governmental appetite for future nuclear power construction. However, if no new nuclear build was politically or financially possible, Margaret Thatcher’s Conservative government could still increase the ‘efficiency’ of the ‘crown jewel’ of British industrial technology by moving the ownership of existing nuclear plants from public to private ownership.

In 1988 (after the Conservatives had been re-elected in 1987) it was announced that their manifesto pledge to privatisate the electricity industry was to go ahead. Both

n.b.: The ‘Nuclear Renaissance’ of the mid-2000s is beyond the scope of this research, which has a cut-off date of 2000.
British Telecom and British Gas had already been privatised by this point, but both had kept their structure and monopoly status largely intact. The Conservative government didn’t want a repeat of their earlier mistakes and so decided that they were going to break up electricity production while leaving electricity delivery largely as it was.\textsuperscript{17} The existing structure (in England and Wales) was of 12 regional electricity companies, which had a distribution monopoly, and the CEGB which owned and controlled all of the different types of power stations (coal, oil, and nuclear) and which also controlled the national grid of power wires. Scotland was privatised ‘as is’: a Highlands and a lowlands company, which controlled both generation and distribution. Taylor (2007: 41-42) cites an interview with a former CEGB manager where the CEGB was described as being there to: support the British coal industry, support British electrical engineering, support the rail industry, and provide (cheap) power to ICI. The accuracy of this statement notwithstanding, it appears to be the dominant view of the government and a situation they were determined to change.

The CEGB was going to be split into two companies: National Power that consisted of 70% of the CEGB (and contained the nuclear stations with, importantly, their future decommissioning costs ‘factored into them’) and a second company that contained the remaining 30%, to be called PowerGen. However, reassessments of the costs of decommissioning the nuclear plants were very soon produced. The CEGB’s initial estimate of liabilities was between £8 and £13 billion, with decommissioning given at the risibly low estimate of £3.7 billion (n.b. by 2000 this figure had risen to £41.8 billion, MacKerron and Sadnicki, 2000). With privatisation now in motion, the Treasury was

\textsuperscript{17} As Taylor puts it “While it makes economic sense to have a single electricity wire coming into your house, there is no reason why the power the wire carries can’t come from a number of competing generators” (2007: 41).
coming up with costs in the region of £15 billion (Taylor, 2007: 43). It was decided, and announced in July 1989, that the Magnoxs would be summarily withdrawn from the sale, as they were the main source of decommissioning costs.

However, the AGRs were now seen as potential liabilities too: their largely unproven track record made potential buyers nervous and so the government was lobbied to fully back the (investing) banks’ debt in case anything went wrong and they lost their money (Chesshire, 1992). When further light was cast on the ‘old’ CEGB accounts—mostly by the new National Power (which, of course, was staffed by vast swathes of the old CEGB Management Board)—nuclear was pulled from privatisation altogether. National Power had its nuclear component cut-out and turned into the (state owned) Nuclear Electric (NE). The true scale of the cost of nuclear then became clear (and even then it was only for the operating costs). NE rapidly lost money; within a year it lost an initial stated value of +£6.3 billion to -£1.6 billion (Taylor, 2007: 45). Now the entire reason for having only two power generating companies, National Power and PowerGen to offset the cost of the nuclear stations, was removed. But it was too late to stop the privatisation process. So, despite the removal of nuclear energy, the grossly mismatched companies were brought into existence.

The newly formed NE (and its Scottish counterpart, Scottish Nuclear Ltd) started to aggressively push down costs—a pre-privatisation team had been “shocked at the uncommercial attitude of many [CEGB] staff” (Taylor, 2007: 53)\(^{18}\)—downgrading many of the research positions and boosting the authority of managers. By 1992 the new Chief Executive of NE was quoted in the company’s newspaper as saying “we are business

\(^{18}\) Taylor continues his un-ironic incredulity: “The CEGB was evidently full of highly qualified people who were interested in complex problems. But they mostly had no concept of customers or of cashflow.”
[sic] and business is war” (Taylor, 2007: 58); by 1994/95 NE net operating loss was ‘only’ £33 million, down from £1.1 billion in 1990/91. (Although it must be stated that NE also enjoyed a ‘Fossil Fuel Levy’ placed upon the other electricity utilities, partly as a means paying for the legacy costs of nuclear electricity but which ended up being used to fund operating costs). In 1993 the Magnoxs, which were still producing electricity, were ordered to close early in order to help boost the profitability of the (now privately owned) coal-fired power stations. As there was oversupply in the energy market, prices were being driven down too low for the private sector to sustain a high enough rate of profit (and NE was the only state-run utility left that would ‘obey’ government commands) (Taylor, 2007: 64).

Nuclear Electric was finally fully privatised in 1996, when it became British Electric (BE). In 1997 and 1998, BE had a healthy share price and was looking to expand into North American markets. One of its purchases (with a US partner energy firm) was Plant No.1 at Three Mile Island—identical to Plant No.2 which was rendered permanently inoperable after its devastating accident. BE also looked to buy a series of Ontario Hydro nuclear plants and build them into a new company, but the Canadian electricity market was not as deregulated as Britain and this proved too difficult. By the time a similar possibility arose again, BE was in serious financial trouble (2001-02) and in no position to act.

Unbelievably, in 1999 BE actually bought a coal-fired power plant (at Eggborough) from National Power. The argument was that it allowed BE flexibility in meeting its contractual obligations. For instance, when an AGR unexpectedly had to close down, the coal plant could step in to meet the loss of electricity output; alternatively, BE was also able to meet ‘shaped’ contracts, where more or less power was delivered to the National Grid depending on the time of day and the demand (Taylor, 2007: 112).
Nuclear stations produce a consistent baseload of electricity and cannot be decreased or increased like a coal station can be (at least not without ‘wasting’ the nuclear fission that is always occurring while the reactor is critical) (MacKerron, 1992).

**Thorp and the SMP**

The building of THORP was completed by 1992 and it only awaited final safety licensing. (BNFL had remained wholly state-owned during the privatisation of nuclear electricity generation.) Greenpeace had, in 1993, sought a judicial review to stop the site from operating, but it had come to nothing. THORP got its license without further problem and began reprocessing in 1994. Walker (1999: 95-96) argues that the Conservative government in the early 1990s was concerned that cancelling THORP (or, at this late stage, just not licensing it) would deeply damage relations with Japan, which had signed contracts with BNFL years before to have their spent fuel reprocessed. After beginning operations in 1994, THORP was beset by a series of problems and closures. In the five years from 1994-1999 when it operated, it only processed 56% of its expected throughput: excessive tritium discharges were higher than expected (so reprocessing had to be slowed to meet the maximum emission levels), and there were several problems with pipes becoming blocked by sediment resulting from liquefied reactor fuel cladding.

In 1981 BNFL had changed the site’s name from Windscale to Sellafield, and so it was in 1994 that BNFL started to construct a £300 million MOX plant\(^\text{19}\) which they called the “Sellafield MOX Plant (SMP)”. This was completed in November 1996 and BNFL

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\(^{19}\) MOX stands for ‘mixed-oxide’. It is a way of combining plutonium and uranium into a pellet which can be used in various types of reactor as a fuel (albeit with some modification to the reactor required). It is also a more acceptable way of transporting plutonium, as MOX is not usable to construct a bomb (although it is still highly radioactive).
sought permission from the Environment Agency to increase discharges (an unavoidable by-product of the MOX fabrication process). Reservations from the Environment Agency meant that SMP became a Ministerial decision, and the plant was given the go-ahead in June 1999.

By the late 1990s BNFL also began to take on an increasingly aggressive stance, it began to position itself in order to develop a worldwide influence. In early 1999 BNFL bought the nuclear power arm of Westinghouse (renaming it Westinghouse Electric Company), and followed this shortly with the purchase of the nuclear arm of Swiss firm ABB. Westinghouse had a strong presence in the US where it manufactured many reactor components, ABB had a strong influence in Asia, supplying several PWRs to South Korea. BNFL finished the 1990s with a wide repertoire of technologies.

1.2 Key Moments in the Development of the British Nuclear Industry

Without wishing to replicate the outline given above, it would seem prudent at this point to identify four key moments that establish and/or identify a specific *industrial* form to the BNI, distinct from a simple subsidiary of the military requirements. The existence of a

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20 The Deputy Prime Minister, John Prescott, who headed the behemoth Department of Environment, Transport, and the Regions (DETR), and Nick Brown, who was in the Ministry of Agriculture, Fisheries, and Foods (MAFF).

21 It is worth noting, despite the ‘out of date range’ of the incidents, that in early 2000 Japan found that BNFL had falsified 22 quality assurance checks on the first shipment of MOX fuel that was returned to Japan. This resulted in the shipment being returned (under Navy escort), a payment of £40 million to the Japanese and free reprocessing of the fuel. Three BNFL staff members were sacked as a result. (BBC, 11 July 2000).

In May 2005 BNFL announced that it had found an unknown leak at THORP that had started in July 2004. Just under 83,000 litres of nitric acid solution leaked from a pipe, into a primary containment unit and then into a secondary containment unit. It contained 20 tons of uranium and 160 kilograms of plutonium (Health and Safety Executive, 2007: 4).

22 However, not only was BNFL considered for privatisation from 1998 (Walker, 1999: 120), but having achieved this very strong market position into the 2000s, BNFL sold Westinghouse (and ABB) because there were contracts with China already signed and as Parker (2009) states: “the government did not think it was appropriate to be standing as guarantor to contracts that Westinghouse had won in China. So potentially that was a very large liability if Westinghouse doesn’t deliver.” BNFL sold Westinghouse Electric to a Japanese firm, Saiban.
separate, civilly-oriented, and commercially focused BNI can be determined from observing moments of ‘conjunctural-disjoint’ that occurred during the course of the BNI. While it is indisputable that the military was the initiator of nuclear energy (in the form of the Manhattan Project) and was a hugely important ‘consumer’ of nuclear ‘products’ (i.e. fissile materials for weapons), the British military took a considerably reduced role after these requirements began to be met. Later, the separation and development of an independent fuel fabrication and waste reprocessing enterprise (BNFL) separate from the AEA, points to at least the assumption that non-military, commercially oriented nuclear activity was a viable option. The third indicator is the major fractures to the expectations of industrial success that occurred in the mid-1970s. The US undertook the unilateral decision to suspend its own spent-fuel reprocessing, to ban the reprocessing of any fuel that contained material originally from its own stockpiles, and to oppose the (still speculative) international trade in plutonium. At this time the FBR, the ‘consumer’ of the projected trade in plutonium, was still languishing in technical and engineering problems. Finally, the privatisation of the nuclear power stations created a specifically commercial and singularly focused commercial entity. Wider non-commercial operations, such as research, were excised from the new commercial entity, leaving only revenue producing generation of electricity as the focus of operation. What follows are four very short reviews of key developments in the BNI.

1: 1954 — *Plutonium production, not energy production*

I have [over there] in the house a book called *Britain's Atomic Factories*, it was published in 1954 and it was the very first publication in Britain that told the public that there was such a thing as a nuclear industry and what it was for. And [back then] they were called ‘atomic factories’ because they were about plutonium production through the Windscale pile[s] for use in nuclear weapons in order for Britain to try and keep up with the United States. So it was very secretive, it had a
military background, and it was just completely state-sponsored at that point (Richards, 2009).

The success of the 1952 Monte Bello bomb detonation was such that the military demanded much greater amounts of plutonium that was originally expected. This impacted upon the reactor design expected to be built after the bomb had been successfully tested; the new military requirements now led to the situation in 1953 where, as Gowing states, “the reactor which had been intended to produce plutonium as a by-product of power now became a reactor producing power as a by-product of plutonium” (Gowing, 1974b: 291; see also Gowing, 1974a: 176). The reactor design in question was the two Windscale plutonium producing piles (PIPPA 1 and 2) that had been expected to be drastically altered towards much more efficient producers of electricity (Gowing, 1976b: 381). Discussions in late 1952 and early 1953 between the research establishment in Harwell, the construction and engineering section at Risley, and the overarching Atomic Energy Board (the precursor to the AEA) were focused around which group should construct the new energy reactors and for what purpose (Gowing, 1974b: 251-3).²³ It was only finally decided at a late stage that the reactor design should be primarily for plutonium production.

The Atomic Factories book mentioned by Richardson in the quote above, is itself quite open about the nature of the Windscale site producing plutonium. It states bluntly that the world is not limited to uranium-238 or uranium-235 as fissile materials because, through fission reaction, it is possible to create plutonium-239. The P-239 is then “extracted chemically from the uranium… this is the principle upon which an important part of the production of fissile material in Great Britain is based” (Jay, 1954: )

²³ n.b. The site of weapons production was always at Aldermaston. As Gowing states, research facilities (and sometimes staff) were seconded to Aldermaston, but the design and construction of the plutonium bomb was conducted only at that site, never at Harwell or Risley.
Whilst it may not have been apparent to many readers of *Atomic Factories* that this link existed between the plutonium-239 extracted from the Calder Hall reactors and Britain's increasing arsenal atomic bombs, if the reader knew what to look for it was quite apparent.

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**2: 1971 — The birth of BNFL**

William Walker: One of the issues is that Ministers tend to—, one of the disadvantages is that they [Ministers] are not as knowledgeable as the industry. My THORP publication focuses on how BNFL controlled information flows, so the DTI [Department for Trade and Industry] who supported it, didn’t have the information they needed. An irony was that after privatisation, access to information became even less. Because then they could-

Nick Hardy: -Commercial secrets-

WW: -Commercial confidentiality. Privatisation was a disaster, actually, for public interest [unclear] (Walker, 2009).

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Tom Burke: Also you know, one of the things is that there is far more collusion between government and the nuclear industry than there should be. I was there advising the minister once when BNFL's response to announcements that hadn't been made came through. Now, they are not meant to have any privileged access to announcements. But they pressed the wrong button on a fax and so it was quite clear they knew and had been informed by the DTI of what was going on and had jumped the gun (Burke, 2009).

British Nuclear Fuels Limited (BNFL) was created when the Atomic Energy Authority (AEA) was first split up in 1971. Prior to this the AEA had a very large remit that encompassed reactor research and design, fuel fabrication and waste disposal, as well as (partial) input into the development of weapons. As MacKerron (2009) stated, the AEA was given “immense political authority: they had a direct Parliamentary vote, they didn’t go through any particular department, and the early chairs of the AEA always had the personal ear of the Prime Minister of the day.” However, the important aspect of this partitioning of the AEA into commercial and research sections was that it supports the position that there *is* a distinct civilian industry. As MacKerron (2009) notes:
in all the countries that have been really prominent in nuclear power
development—and I'm including here France, Sweden, the United States, Canada,
Britain, among others, - Germany latterly (and Germany, interestingly, because of
course Germany hasn't been permitted nuclear weapons)—you cannot explain it
much in relation to the military or military technology. It developed a momentum of
its own (ibid.).

Part of this "momentum" was the belief in the viability of nuclear power (discussed in
more detail below); the other was the expectation that there existed an entire industrial
capacity which could actually be made to make a profit. This was either in the form of
energy production, or in the form of dealing with the end products in the later stages of
the nuclear fuel cycle, i.e. reprocessing. 24

3: 1976-8—Waking from the plutonium dream
[The fast breeder programme] actually started in the mid-1950s, it petered out in
the mid-1990s. Yet in the course of the time it was running, it was the single black-
hole for public funding for energy research of every kind. It mopped up a
stupefying amount of highly skilled people and it was an absolute blind alley.
Nothing to show for it—except this long-term mess that they have to clean up at
Dounreay. And yet if you go back historically, as I do in Going Critical, the kind of
pronouncements that were made by people who were actually advocating
spending this money, they—I'm not going to mince words about this—I think some
of them should be in jail. You know, the dishonesty of some of the stuff that was
said when you compare it with what subsequently happened, certainly they should
not have been retired with, you know, CBE's and KBE's and Baronets (Patterson,
2009). 25

Fast breeder reactors and the plutonium economy
Part of the initial appeal of the AGR was Britain's assumption that by-products from it
would feed into Britain's (proposed) 'breeder reactor' programme. Spent fuel would be
reprocessed and the plutonium extracted, this would then fuel the FBRs; this, according
to Williams (1980: 97), was a key part of the AGRs potential commercial merit. Very

24 Reprocessing is a vital stage for the acquisition of the plutonium generated by the fission in the
reactors core, but it is expensive, highly dangerous, and vastly increases the volume of waste
material.
25 KBE: Knight Commander of the British Empire. CBE: Commander of the British Empire.
simply put, a breeder reactor uses the highly unstable plutonium-239 (Pu-239) as a fuel, but also—and this is the ‘breeder’ aspect of it—a ‘blanket’ of natural uranium (U-238) is placed around the core. As Pu-239 gives off huge neutron emissions, this neutron bombardment is absorbed by the U-238 which then becomes subject to fission itself—breaking down into Pu-239 and other materials. In theory, the reactor thus produces more Pu-239 than it uses. Breeder reactors are also ‘fast’ reactors: i.e. they contain no moderator to slow the neutrons down to ‘thermal’ speeds, as happens in the majority of reactors. There are, of course, still control rods and coolants used but the reactor emits very fast and penetrating neutron radiation.

However, the process suffered from two major problems: one was the extremely high level of radiation that it produced; the other was that the plutonium core operated at such an extremely high temperature that it required liquid sodium to be used as a coolant. The engineering and theoretical problems that the FBR raised were extreme—as were the potential for the FBR to have a catastrophic malfunction. It is not by chance that Britain’s two FBR reactors (one a prototype, the other experimental) were at Dounreay, a site on the northernmost shore of Scotland.26

The ‘plutonium economy’ was the expectation that when FBR technology finally (‘inevitably’) overcame the problems associated with it and was a viable reactor technology, plutonium would be traded worldwide as fuel for FBRs. The “plutonium credit,” as it was referred to in the BNI, consisted in the arbitrary creation of a value for plutonium based on the hypothesised rate plutonium would receive on an open world market. The value placed upon plutonium was extreme: for instance, in 1952 plutonium

26 To jump ahead somewhat, the FBR programme in Britain—and the wider world—was almost a total failure. The ‘demonstration’ and the ‘prototype’ FBRs at Dounreay were plagued by mishaps, accidents, and technical and engineering problems.
was valued at £100 a gram or £3,100 an ounce; for comparison, at the same time an ounce of gold was valued at £12 12s (Gowing, 1974b: 292). This massive—but importantly *fictional*—value attributed to plutonium became a cornerstone of nuclear economics that justified investment in the BNI. The utter sincerity with which the belief that both FBR technology could be successfully developed and that a plutonium economy would eventually manifest was, at least in the early to mid-stages of the BNI, almost absolute.

However, in 1977 US President Jimmy Carter continued a policy outlined by his predecessor, President Gerald Ford, that in order to stop or at least severely retard the proliferation of nuclear weapons, US reprocessing for plutonium extraction would cease. Consequently the US abandoned the domestic reprocessing of spent fuel and it also declined to give consent for the reprocessing abroad of plutonium with an origin in US supplied fuel (Walker, 1999: 11; Patterson, 1985: 84-85). Despite British claims that Carter’s comment did not really apply to the BNI, the US decision effectively destroyed the idea of a plutonium economy.

*THORP (Thermal Oxide Reprocessing Plant)*

Nineteen seventy-seven saw the Windscale inquiry run from June to November. Chaired by a judge, Mr Justice Parker, and working to a remit of three carefully crafted questions, it took evidence regarding the need and the safety of the proposed THORP plant. The evidence presented by BNFL, the AEA, and the government appeared to many observers to be shaky and based on inflated projections. For example, Walker (1999: 19) cites a BNFL claim that THORP was necessary in order to fuel an *eighth* FBR: at the time—assuming even one FBR could have been made to operate—Britain had existing stockpiles of plutonium that would already have satisfied seven FBRs. Indeed, as
Wynne argues in his analysis of the Windscale inquiry, examples such as this indicate the "emotional commitment" held by members of the nuclear industry and which regularly manifests as "under-estimating uncertainties, exaggerating forecasted needs, and smoothing over 'incidents'" (Wynne, 1982: 166).

The report, when it appeared, was a rejection of every anti-THORP argument submitted and the promotion of the BNFL and AEA case. As Patterson states (2009) one of the tactics employed was to lump all of the non-governmental representatives together, creating the situation where: “other [objectors] made it possible for [Justice Parker] to muddy the waters completely; and to assume, and to suggest—and to say outright—to attribute to [Friends of the Earth] opinions that we had never held.” By May 1978 the House of Commons had approved the inquiry’s recommendations and THORP was scheduled to start construction. However, as Walker states, the “main rationale ([for] the supply of plutonium fuels) [was] stripped away by changes to energy markets” (1999: 3). However, the Windscale Inquiry concluded that THORP was worth the investment and construction duly began. The lure of the (confirmed) Japanese and (anticipated) West German reprocessing contracts—even without any expected benefit from extracting domestic plutonium from British reactor fuel—were seen as reason enough to go ahead with the construction project.

4: 1996—Privatising electricity production

Keith Parker: …[T]here was the commercial issue which was that the true costs of nuclear had been hidden in the CEGB’s accounts. And the money that should have been put aside for decommissioning the stations had actually been spent on other projects. And so when the accountants started looking at the CEGB’s accounts, they decided that the liabilities for any private company and the decommissioning nuclear stations was so uncertain that no one would take on that risk, that potential liability. So they [the government] pulled nuclear from the privatisation.

…
KP: …[T]his crucial turning point around privatisation, I think, really is [crucial]. You cannot underestimate the real change that it generated in the industry.
Nick Hardy: Was it suddenly a sense of their own commercial viability?
KP: It was both commercial and competitive drivers. Nuclear had to earn its keep, if you like. It wasn’t being cross-subsidised by the CEGB and its rather Byzantine accounting procedures (Parker, 2009).

Still as a wholly government owned industry, an internal programme of commercialisation was instituted where research and development were almost entirely excluded, electricity production becoming paramount. Despite a seriously poor management decision to pay out shareholder dividends instead of further investment (a decision that ultimately required yet another huge government bailout), the two state-run companies became consistently profitable, were combined into British Energy in 1995, and were finally sold to private investors a year later in 1996.

Despite the debacle of the botched 1989 privatisation, the scheme illustrates the belief by the Conservative government that the electricity producing BNI was a viable commercial venture. As was clear from many of the interviews conducted for this research (Brown, 2009; Parker, 2009; Walker, 2009; Wilkinson, 2009), once a nuclear power station has started operating, it is largely a cash cow—i.e. it generates large income with comparatively little management. Once the singularly commercial ethos had stripped away all of the research and design aspects, dramatically reduced the workforce, and focused solely on electricity production, the AGR stations (the few remaining Magnox reactors were thrown into privatisation for free) and the one British PWR built at Sizewell B operated without much problem.

Conclusion
At the end of her huge, two volume work, Independence and Deterrence, Margaret Gowing (1974b: 505) gives a knowing wink to the reader with these closing lines: “Monte
Bello was the symbol of the great success of the [British] atomic project, so soon to begin construction of the world’s first nuclear power station [at Calder Hall]. Was success to be enduring or was it once more to prove a bitch goddess?” The reader can only respond: “indeed.” What is intriguing about Gowing’s statement is that “success” is left ambiguous. Is success for the BNI the overcoming of inherent difficulties regarding the materials used, or is success overcoming the social circumstances in which that inquiry takes place? Materially, radioactive matter is both hazardous and difficult to manipulate; socially, what might at first appear as a common, albeit scientifically novel, set of institutions seemingly descends into a morass of ad hoc and ill-thought-through decisions.

The proposal made by this thesis is that neither human agents nor material forces should be especially privileged as a focus of investigation. This is not meant as a simple axiom that both humans and materials should simply be given equal theoretical consideration. Instead, by focusing upon the unique character of the materials used in the BNI, it becomes clear that human actions are shaped in response to those materials, rather than in accordance to a ‘grand social design’. It should also be stated immediately that this is not imply material determinism—e.g. all activity in the BNI can be explained as simply ‘expressions of its materials/materiality’. There were, are, and will be serious and meaningful activities undertaken by numerous social actors within the BNI. However, the BNI is an example of an institution so specialised in their response to the materials with which they work, it is probably only akin to the chemical industry, biotechnology, or space programmes in terms of its continuous regard toward the material objects that populate it. Many of the ‘victories’ that have been ‘won’ in the BNI have been achieved precisely by overcoming the constraints exerted by the materials themselves.
As was outlined in the Introduction, the focus of this thesis is to outline and use an integrated theoretical argument to produce a new and, importantly, non-reductionist account of how the materials utilised by the BNI play an important role in shaping the BNI. Similarly, the thesis interrogates the social circumstances that can (but not necessarily always do) operate to shape the outcomes of events that occur within them. By focusing on both discursive and social structures the parameters within which decisions were taken become apparent. For instance, the highly secretive activity of producing nuclear weapons meant that nuclear research—which is closely tied to both weapons and reactors—was always at least ‘once removed’ from customary oversight procedures. To give one interesting example, the institutional power of the AEA was wielded in this context: the AEA was judge, jury, and ‘commissioner’ of its own work. Not undeservedly, the British scientific community was buoyant at its own success in even producing a viable BNI. This same discursive, institutional, and material set of relations that had endured a world war and, in Britain’s case, scientific isolation had produced major successes. It would appear that the resultant attitude was “if it ain’t broke, don’t fix it.” However, as became clearer later on, what works in one context does not necessarily work in another.

In identifying the key moments signifying the emergence of the BNI, the 1954 decision to make plutonium the central aspect of the Magnox reactors is important because it shows the need to make this a priority. If there was no plan other than to make plutonium for weapons, then this outcome would not have needed to be restated as a priority in the first place. That fact that it was necessary to articulate indicates that there was a firm push to create a civil—i.e. non-military linked—BNI. Similarly, by the time BNFL was created in 1971, it was becoming clear that British designed reactors—the AGRs—were, more likely than not, going to fail as an exportable technology. With
the failure of the AGRs already evident by the end of the 1960s, “it became apparent that the only commercial opportunities for Britain resided in the fuel-cycle,” i.e. in reprocessing (Walker, 1999: 8). Here there is the beginning of a shift from an industry oriented toward electricity production, to an industry centred around materials extraction and reclamation.

The crushing of the expected plutonium economy, coupled with the almost total failure (worldwide) of the FBR programme, removed a large part of the rationale for the reprocessing side of the BNI. With no viable domestic reactor technology to export, and vastly reduced scope for what could now be reprocessed, THORP’s commercial focus was almost entirely centred on the creation of mixed-oxide (Mox) fuel.27 Finally, the ‘successful’ privatisation of the nuclear power plants in 1996 was, from one perspective, the ultimate success in commercialising the BNI. By isolating the part of the BNI that actually produced electricity from any wider institutional context, it became possible to make individual power plants generate a profit.

27 Mox fuel is a combination of plutonium and uranium oxides that can be used as fuel in specially converted reactors. A separate Mox production plant was built at Sellafield, but this has also run into serious technical issues.
Chapter 2
Critical Realism as Philosophical Underlabourer

Introduction
To talk about “critical realism” is to necessarily include a variety of differing positions under the critical realist rubric. What is probably indisputable is that all critical realists count themselves as relating, in some way, to the works of Roy Bhaskar. It was Bhaskar’s groundbreaking 1975 publication of A Realist Theory of Science (1978/2008, hereafter RTS), that began critical realism. In the social sciences it offered an alternative to the turgid structure vs. agency arguments, and in the philosophy of science offered an alternative to the equally sterile and ossified dispute between empiricism vs. idealism. Bhaskar followed RTS with The Possibility of Naturalism (1979/2005, hereafter PN) which is his move from the largely philosophy of science oriented discussion in RTS to an explicit attempt to formulate a more sociological theory in PN. As the following argument concludes, Bhaskar was largely successful in his attempt: the principles outlined in RTS are fleshed out in PN and placed within the existing context of social science discussions. PN also engages with the positivist and interpretivist/hermeneutical positions that were (and arguably still are) dominant in the social sciences.

However, the internal disagreements within critical realism begin with Bhaskar’s third book Scientific Realism and Human Emancipation (1986, SRHE). As Potter (2007: 79) states: “Bhaskar reverses the direction of the critical trajectory of Feuerbach and religion to Marx and political economy, with a ‘return’ to religion.” This trajectory continued with others of Bhaskar’s books, provoking an outright hostile response from some critical realist authors (MacLennan, 2000; Potter, 2006) and cementing the
fractures already in place between critical realists. It is usual now for critical realist writers to state where they will place the emphasis of their studies (e.g. Elder-Vass, 2008b: 456). With this in mind, this study explicitly utilises the early works of Bhaskar (RTS and PN—viz. “scientific realism”) and does not engage with the more ‘spiritually reliant’ later works.

This chapter begins with an outline of core ontological and epistemological elements of critical realism. The two books, RTS and PN, form the backbone of this outline which examines: the uniquely critical realist conceptions of *retroduction* and *retrodiction* and the (sometimes) complex arguments for *causation*. The two very important concepts of *events* and *emergence* are then discussed, along with their interlinkage into the wider critical realist theory. A large amount of critical realism has been developed through theoretical application and it is here that discussion turns to the development of the concept of *social structure*. Following this is a brief outline and comparison between critical realism and its closest comparator theory, Actor Network Theory.

2.1 Core components of critical realism

*‘Scientific realism’ and explanation*

In RTS, Bhaskar argued that the natural world is stratified into three distinct ontological levels: the *real*, the *actual*, and the *empirical*. The domain of the real contains the multitude of intransitive, natural, generative *mechanisms*, which are, according to Bhaskar, “nothing other than the ways of acting of things” (RTS: 14). The domain of the actual is where various conjunctive *events* occur—i.e. where mechanisms come into conflict or congruence with one another and so produce various effects. The empirical consists of the experiential world, where only a limited number of the effects and
mechanisms in operation in each particular event are apparent. It is in the empirical world where scientific experimentation occurs and it can, under the appropriate conditions, produce *transitive knowledge* (i.e. non-permanent knowledge open to both revision and refutation) of both events and mechanisms (RTS: 1978/: 21, 23; 1979/2005: 11).

Developed as a philosophy of science that positioned itself at the crux of the dispute between positivism and hermeneutics, critical realism engages both in regard to: (1) the form and operation of ‘science’ and (2) the form, operation, and structure of ‘society’. Positivism, at its core, claims that knowledge is generated through empirical experimentation because experimentation demonstrates the existence of constant conjunctions. These conjunctions constitute demonstrations of cause and effect, which positivism then equates with ‘causal laws’. The knock-on effect of positivism for social science is that social science is deemed to be (largely) impossible, mostly due to the unachievability of the conditions required for isolated empirical experimentation; ergo accurate knowledge of society is unobtainable (*PN*: 15). Hermeneutics, by comparison, sees scientific knowledge as distinct only insofar as it has more defined processes for producing itself. However, the hermeneuticists argue, as detailed by Kuhn (1962/1996) in *The Structure of Scientific Revolutions*, science does not actually operate on such a basis of certainty that positivism invests in it. Instead, from the hermeneutical perspective, science is but one “language game” among many others (Lyotard, 1979/1993: 25-26). Society, meanwhile, consists of the continuous interaction between human agents, each of whom instil their actions with meaning and intent.

In *PN*, Bhaskar rejects both positivism and hermeneutics as adequate means for investigating the constitution of science and society. With regard to the nature and form of ‘science’, critical realism repudiates both the positivist reduction of science to the
‘simple empiricism’ of observing constant conjunctions and the hermeneutical position that science is mere ‘verbal construction’. Instead, Bhaskar argues that what defines science as a distinct practice is not the outcome of natural scientific experimentation but the process of natural science (PN: 9). Scientific experimentation works to exclude additional mechanisms from interfering in the operation of a particular mechanism under study. As a mechanism is only the tendency\(^\text{28}\) of a thing/object to operate in a particular way—but which it is usually curtailed by the mechanisms of other things/objects which intervene to block its operation—scientific experimentation acts to isolate one mechanism and allows it to operate unimpeded.

The objects of experimental activity are not events and their conjunctions, but structures, generative mechanisms and the like (forming a real basis of causal laws), which are normally out of phase with the patterns of events which actually occur (PN: 9).

Reinterpreted in this way, science is both experimental and theoretical. Experimentally, science is the practice of establishing a closed system (RTS: 53), so isolating a mechanism and allowing it to operate unimpeded. Theoretically, science establishes accounts for how and why known—or even unknown, anticipated, or merely postulated—mechanisms operate in different contexts. Furthermore, by adopting the criterion that causal laws are the tendencies of things/objects and not ‘constant empirical conjunctions’, critical realism avoids the logical (but always overlooked) step that positivists unwittingly take whereby they are (logically) forced to imply that all conjunctions, natural or social, must therefore be laws (PN: 9, 15)\(^\text{29}\). Therefore, by

\(^28\) Discussed in more detail below, tendencies are powers that may switch-on and operate but remain unrealised (RTS: 229). A power, on the other hand, is always realised when switched-on and operating.

\(^29\) If the positivist position is that only observable results via the method of scientific experimentation are valid (and no wider theoretical argument is required), then positivists have no
redefining the ontology of the object(s) which science investigates, critical realism bypasses the inherent reductive empiricism within positivism and the verbal constructionism within hermeneutics.

**Accounting for social relations**

Bhaskar’s argument for understanding social relations develops further his criticism of positivism and hermeneutics. Positivism itself largely excludes the possibility of any real social science because, as mentioned above, there is no possibility of experimentally isolating parts of ‘the social’ in order to ‘scientifically’ examine them. Bhaskar’s rejection of the positivist definition of science shifts the onus of social scientific inquiry to examining tendencies; this moves inquiry from mere observation to developing an active theoretical account of what factors likely exist to account for a particular phenomenon (*PN*: 12).

Hermeneutics, meanwhile, in order to escape positivism’s “hegemonic” (*PN*: 19) hold over the social sciences collapses into voluntarism: “…writers in the hermeneutical tradition have adopted the positivist view that the objects of knowledge are events (or their counterpart in the domain of the human sciences, action)” (*PN*: 20). The positivist emphasis upon events has been transcribed into the hermeneutical tradition—which Bhaskar takes to include Weber, the later Wittgenstein, Anscombe, Dray, Charles Taylor, and Winch (*PN*: 18)—which manifests as a pseudo-natural science that examines observable social phenomena: i.e. social actions. By beginning from the axiom that *individuals* create their own actions, this negates the opportunity—or the theoretical or

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*means* by which to say that an artificially constructed conjuncture is not, therefore, also a scientific law. This is because of positivism’s emphasis on *simple cause and effect* being the arbiter of establishing what is a law. Of course, the fact that they do not hold this position in real life just proves the point that they do not follow their own logic—precisely because it does not work without further *theoretical* refinement, a position that they try to avoid.
methodological possibility—of examining actions as being part of a deeper social ontology. (It is worth stating that the parallel holds true for positivism in terms of a rejection of any possible deeper natural ontology; although, of course, with positivism the focus is on simple experimental relations, not social action.)

Bhaskar’s alternative to positivism and hermeneutics is what he terms *transcendental realism*. This is the move from examining manifest phenomena to investigating the background structures that generate them.

It shows that experimental and practical activity entails an analysis of causal laws as expressing the tendencies of things, not conjunctions of events (‘epistemology’); that scientific discovery and development entails that scientific inferences must be analogical and retroductive, not simply indicative and/or deductive (‘logic’); and that the process of knowledge-production necessitates a conceptual system based on the notion of powers (‘metaphysics’) (*PN*: 19).

Social scientific inquiry is *not* the same as natural scientific inquiry; however, by redefining the operation of scientific inquiry as a whole (i.e. by moving the focus from events to tendencies) then ‘social science’ becomes possible.

The strengths inherent in this realist approach are twofold. First, realism acknowledges the ability of humans to gain some transitive knowledge (*PN*: 11) of the natural and social world but all the while recognises that this knowledge is fallible. This is because the *ontologically distinct* external world does not rely upon any form of human understanding in order to operate (Frauley and Pearce, 2007: 4-5). Second, realism rejects the empiricist/positivist approach that holds only empirically demonstrable occurrences can count as ‘knowledge’. And by making explicit the mistake inherent in positivism (i.e. the focus on events not tendencies), realism reopens the ability to theorise by postulating tendencies and powers to be in effect, even if they cannot (at a particular point in time) be empirically demonstrated. By acknowledging the multi-level complexity of the world, realism explicitly ‘brings theory back in’ as a necessary
component part of any complex explanation. Bhaskar makes explicit this aspect of retheorisation when he summarises his understanding of sociology:

Sociology is not concerned, as such, with large-scale, mass or group behaviour (conceived as the behaviour of large numbers, masses, or groups of individuals). Rather it is concerned, at least paradigmatically, with the persistent relations between individuals (and groups), and with the relations between these relations (and between such relations and nature and the products of such relations) (PN: 28-9, emphasis in original).

Explaining closed and open systems: retroduction and retrodiction
Closed and open systems provide a crucial part of critical realist theory, with the two concepts distinguishing between bounded and unbounded systems (n.b.: this is somewhat contra Buckley (1967), see below). Closed systems exclude mechanisms contained in other entities from interfering in the operation of the mechanism(s) contained within that particular closed system (RTS: 53). This exclusion of external mechanisms is what enables closed systems to be predictable: they continue to produce the same events because there are only a limited and definite number of mechanisms contained within it. Scientists work so hard to create closed systems during experimentation precisely because they give this assurance. Within a critical realist ontology, a closed system enables the mechanism contained within a thing—“the way of acting of a thing” (RTS: 14)—to operate unimpeded. Closed systems are not singly created by scientific experimentation, they also exist externally in the natural world: an example might be the forces of nuclear attraction that keep an atom in a (relatively) stable form.

Open systems, by contrast, are relations between elements that either do not or cannot exclude interference from other entities. In this way their operation can be (and usually is) affected not only through their internal elements but also by the (intermittent) effects of causal mechanisms produced by other external entities. A major effect of
being unable to exclude external mechanisms is that reliable prediction becomes impossible. This makes comparison between closed and open systems fraught with difficulty. As Sayer (1992: 182-186) highlights, the move from closed to open systems breaks apart theoretical models (which—usually—presume a closed system) unless the theoretical model is on a particular and already existing data set (ibid.: 182). Sayer’s point is that even empirical models (which are necessarily made using existing data) already know the exact parameters, but it is when they are applied to the (open systems) of the real social world that they fall apart.30

Bhaskar argues that there are two models for explaining events. The first model is the retroductive ‘DREI model’ and is used for producing theoretical explanations and for accounting for the operation of closed systems. Bhaskar terms it analogical-retroductive and it consists of: “description of law-like behaviour; retroduction [sic.], exploiting analogies with already known phenomena; elaboration and elimination of alternative explanations; [and] issuing (ideally) in the empirically-controlled identification of the causal mechanisms at work” (Bhaskar, 1986: 46; Pearce, 2007: 39; Potter, 2008).

The second model is the retrodictive ‘RRRE model’, this is used to produce practice-based explanations that give an account of open systems. It is decomposatory-retroductive and consists of:31 “resolution of a complex event (situation, etc.) into its components; redescription of these components in theoretically significant terms; retrodiction [sic.], via independently validated normic or tendency statements, to possible

30 It is worth noting here that this argument is very similar to Althusser’s analysis of Marx’s theoretical breakthrough by using his existing empirical (concrete) environment to build a theoretical model. This was then turned into his highly developed, but highly abstract, theory. This was discussed in the Introduction and will be again in section 3.4.

31 Bhaskar’s original usage of the RRRE was as the ARRE: “(i) Causal analysis (or resolution) of the event; (ii) theoretical redescription of the component causes; (iii) retrodiction via normic statements to possible causes of the components; (iv) elimination of alternative causes” (RTS: 125, emphasis in original).
antecedents of the components; and *elimination* of possible causes” (Bhaskar, 1986: 46, emphasis in original; Pearce, 2007: 40) (see also: Archer et al., 1998: xvii). Broadly the two forms of explanation, retroduction and retrodiction, respectively produce either precise identification of the mechanisms and entities involved in an event, or articulate an account that details the interaction of different elements during an event (RTS: 125; PN: 12, 19, 129; Lawson, 1997/1998: 164-165; Elder-Vass, 2007a: 472).

Bhaskar devotes more time to discussing retrodiction than he does retroduction. Retrodiction was first introduced by Bhaskar as part of his wider rebuttal of Popper’s ‘falsification’ thesis. Bhaskar’s argument (RTS: 128) is that Popper makes a mistake in transposing the natural science method of experimentation (which studies closed systems) onto the wider social context (which consists of open systems). In order to conduct any analysis of an open system, Bhaskar argues, the four stage *RRRE* process is necessary. Specifically, retrodiction is “the inference from present effects to prior (perhaps hidden, perhaps just unrecorded) causes, via the application of normic statements” (RTS: 135). As prediction is impossible in open systems (hence Bhaskar’s use of the alternative term ‘explanation’, RTS: 135-137), the closest alternative is “practical predictions of categorical form” (Bhaskar, RTS: 135)—i.e. developing retrodictive accounts of events and then (cautiously) arguing that similar future events are possible and likely. This is developed further in *PN* where Bhaskar argues that *explanation*, not prediction, is the outcome of social science (e.g. *PN*: 12, 43, 46, 63-64, 100, 129, 160).

Retrodiction, therefore, is part of a realist methodology that investigates “empirically apprehendable phenomena” as “effects that are related in a complex way to underlying and sometimes obfuscated constitutive and sustaining processes” (Frauley and Pearce, 2007: 20). As such, retrodiction can be used to develop accounts of
relations within open systems—including where some of these relations may operate as closed systems contained within broader open systems—and to determine the form that events may take, e.g. cyclical, contingent, synchronic, diachronic, etc. For the argument being developed here, retrodictive analysis is important because it allows for the development of an account of both events and the production of entities.

**Real and actual causation**

Critical realism incorporates an important division between two types of causation: real and actual. *Real causation* refers to the tendencies of mechanisms (operating from the domain of ‘the real’) to cause effects, leading Bhaskar to claim that the “world consists of mechanisms not events” (*RTS*: 47). In other words, the world is constituted by elements (things) many of which have properties (mechanisms—in the form of tendencies or powers) that, in different circumstances, may or may not causally affect other elements. An important point to note is that Bhaskar normally uses the term ‘tendencies’—*not* ‘powers’—to describe the operation of mechanisms, for the vast majority of mechanisms do not necessarily cause an effect when they ‘switch on’ (*RTS*: 50). For instance, it could be that the interacting forces of different mechanisms counteract, override, redirect, or nullify one another so producing no discernable outcome—but even no outcome is still an outcome *per se*. ‘Powers’, meanwhile, refer to potentialities which may be exercised *and* realised at any time. As Bhaskar states:

> For whereas powers are potentialities which may be exercised, tendencies are potentialities which may [already] be exercised… or ‘in play’ *without* being realised or manifest in any particular outcome (*RTS*: 50, emphasis added).

And also again in *PN*:
Thus, just as a rule can be broken without being changed, so a natural mechanism may continue to endure, and the law it grounds be both applicable and true (that is, not falsified), though its effect (i.e. the consequent) be unrealised (PN: 11).

*Actual causation* is different for Bhaskar, referring instead to the particular forces that interact during a conjunctural event to cause an effect (all of which takes place in the mid-domain of ‘the actual’). All events are, therefore, constituted by a particular number of interacting causal mechanisms (i.e. one or more). The point of distinguishing the two, Bhaskar argues, is to be able to identify specifically the causal mechanisms that *actually* produced an effect during a specific event (RTS: 34, 50), and not simply other mechanisms that were present but only *might* have produced that event. To put this in other words, what mechanisms were specifically active in creating a particular event, not simply which mechanisms were present at the time. It’s the difference between finding the actual culprit(s) to a robbery rather than just taking a list of everyone in the vicinity and apportioning blame to both robber(s) and bystander(s) alike. Developing this perspective, critical realists count social events as always being ‘multiply-determined’ (RTS: 110-111; PN: 43, 170; Elder-Vass, 2005: 333; 2007b: 171). It *might* be possible that an effect manifests in the social world as the result of a single mechanism, but given the open system nature of social relations, critical realists assume that social events are the result of a multitude of causal mechanisms. The various ‘things’ which produce it may vary in their complexity and number of ‘downwardly inclusive’ levels, but the mechanisms they manifest can all combine to produce a particular conjunctural event.

This multiple-determination argument produces an important distinction: it articulates a *level-abstracted view* of causation (i.e. mechanisms are contained in the real, events occur in the actual, and experience in the empirical) which is important because it separates the background forces (mechanisms, etc.) from the event(s) that they create and the limited experiences that humans have contact with. However, as
Elder-Vass (2007b) argues, this usefulness only goes so far before it becomes a confusing—and contradictory—aspect of Bhaskar’s work. An important part of this is the realist argument for the production of entities (covered in further detail below). It is important because entities are formed through events occurring in the actual, but many mechanisms are the product of entities—i.e. the mechanism did not previously exist until formed by the entity itself. If, as Bhaskar claims, mechanisms are only ever found (pre-event) in the real, then this subtle distinction can cause problems for realist analysis if it is not resolved.

For the large majority of research employing a critical realist analysis, it is sufficient to use the concept of real mechanisms to explain factors in events. For instance, dogs possess a real mechanism that enables them to bark and it was the barking which deterred the would-be burglar. This perspective attributes to the dog possession of a level-abstracted property (its ability to bark); it is not usually necessary to go into the constitutive levels (i.e. the actual levels) of the dog—i.e. its physiological, cellular, atomic, and DNA—to explain its warding off of the would-be intruder. However, there are accounts where a more detailed analysis of the constituent levels of an entity is necessary in order to produce a sufficient explanatory account.

As Elder-Vass (2007b: 168) argues, Bhaskar’s ontological siting of mechanisms as only existing in the real becomes “quite inappropriate for the discussion of what is happening over multiple levels when we turn to causation at the level of individual instances” (see also Pearce, 2007: 50-53). Conjointural events are important because

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32 This distinction is important because otherwise there is a danger of slipping in a quasi-Platonistic argument for mechanisms being the real manifestation of some supra-metaphysics of ideal ‘Forms’. Some mechanisms do not exist at lower levels of entity composition—the ‘mind’ or ‘photosynthesis’ might be two examples—as they are only the product complex creatures (the mind) or at least multi-cellular organisms like plankton or plants (photosynthesis).
they are an interplay of particular mechanisms. But in many instances these particular mechanisms—such as a dog’s bark or a plant’s ability to photosynthesise—are themselves the result of complex multi-level entities. These multi-level entities are themselves reliant upon the continued operation of their particular constituent levels. Elder-Vass terms the analysis of these constituent levels a “downwardly inclusive view” (2007b: 170). Elder-Vass uses the example of explaining photosynthesis in a plant: at the highest level there is the ‘plant’ itself, under this are its cells, then under this are molecules, then all the way down to the “mists of our understanding of sub-quantum science” (ibid.: 163-164). Each one of these levels plays its part in ‘causing’ the event because it plays a part in the continued operation of the complex entity. If the heart of the dog or the burglar ceased to beat for long enough, then either no dog would have been alive to bark or no burglar alive to burgle. However, the continued beating of the hearts of both the dog and the burglar are implied in the level-abstracted view of the dog’s bark warding off the intruder.

In some instances it becomes important to investigate the composition of those relations as this aids in explanation of the ‘final’ mechanism that produced the effect—it is here that the level-abstracted view is unhelpful. This is because the level abstracted view is unable to conceptualise at the same time the particular levels of synchronic relations within each entity necessary to produce an event. Complex entities (like burglars, dogs, and plants) exist as a pyramid of previous events, all bound together into the complex entity that they now constitute. In some instances adequate explanation requires that complex entities themselves must be explained as to how they, for example, maintain these particular composite relations and so produce their higher-order mechanisms.
The implications of this position are that entities ‘exist’ as a consequence of events in the actual and can possess causal powers. The trouble with Bhaskar’s insistence that causal powers must ontologically only be sited in the real is that it separates causal powers away from a thing—even when the causal power may only exist as a consequence of that thing existing! Depending on the level of analysis required, an adequate explanation of causation can include up to three types of explanation: the resultant mechanisms possessed by the entities that possess them; the forces and relations that maintain the various sub-levels of those entities; and, finally, the actual operation of those mechanisms as causal forces. However, as should have become clear at this point, in order to move on further with this analysis, a more detailed discussion of both events and the processes forming emergent entities is required. It is to these topics that this argument will now turn.

**Events**

In critical realism the concept of ‘event’ refers to an occurrence—that is, the interaction or operation of mechanisms. It is worth noting that ‘event’ is used as a philosophical descriptor—i.e. to denote *any* occurrence, no matter where it occurred or how big or small it was. This avoids the implication that if something is termed ‘an event’ it has either passed some level of magnitude, or that it has been subjectively considered interesting enough and so labelled an event. This inclusion of the everyday mundane into the category of events is part of the strength of critical realist ontology. By removing the threshold of scale (and keeping only the criteria of *occurrence*), the fallibility of human knowledge and perception are drastically reduced from the process of inquiry—i.e. “did something occur?” becomes the question, *not* “did something occur—and do we think it is important?”
Events take place in both closed and open systems. The difference between the two is that in closed systems “a constant conjunction of events occurs,” while in open systems “two or more mechanisms, perhaps of radically different kinds, combine to produce effects. … Most events in open systems must thus be regarded as ‘conjunctures’” (RTS: 14, 119, emphasis added to both). Closed systems produce the certainty—and the predictability—of constant conjunctions that result from a finite number of mechanisms; open systems are instead influenced by an unknown, and likely widely varied, number of mechanisms.

The concept of events is disarmingly simple yet can include a very large range of different circumstances, effects, and outcomes. Events can incorporate the banality of a pen falling from a table (Elder-Vass, 2007b: 165-166), the chemical bonding of hydrogen and oxygen to produce water molecules (Elder-Vass, 2005), or even up to “the uniqueness of historical events” (RTS: 227). Events can also produce both short and long term effects, from the near instant explosion of a given quantity of TNT to the enduring structure of Westminster Abbey. An important corollary of this position is that the ‘things’ which contain the mechanisms which populate the real are, mostly, themselves the products of events. Bhaskar terms these things ‘compounds’ (RTS: 227), meaning that they are the outcome of (at least) one event that formed them. Human knowledge has not yet adequately conceived (let alone analysed) the full composition of the sub-atomic world, but knowledge of it has established that atoms are compounds of ever smaller elements. The importance of a conjuncture (‘an event’), therefore, is that the result may be the formation of an entirely new thing, including the creation and possession of new causal mechanisms. From the sub-atomic level of quarks and leptons, to dogs, to economic crises, all are the result of enduring compounds—with each possessing real mechanisms.
This brings the discussion back to the importance of the real/actual causation confusion: was Bhaskar correct to argue that a compound thing (which was, of course, produced during an event in the actual) should have its causal mechanisms sited in the real and therefore separate from it? As Elder-Vass argued, of course not. A thing may be a compound produced through an event in the actual, but it itself possesses the causal mechanism. Therefore, in any open system event, a multitude of things have the potential for real causation—it is when one of these compounds is analysed using a downwardly inclusive view for its necessary internal working that the complexity of the situation becomes apparent. The dog barking at the (potential) intruder relies upon its physiological, cellular, atomic, and sub-atomic structures to continue to endure in order to allow it to bark. However, it is not necessary to always account for these lower levels when being simply relieved that the would-be intruder was dissuaded from entering the house—alongside the fact that the bark came from a Doberman and not a Chihuahua.

**Emergence**

One of the possible outcomes of an event is the generation of a ‘compound’ thing. However, sometimes the newly created thing may have resultant properties that were not present in any of the elements that went into forming it. When this occurs, Bhaskar terms it an emergent property. Emergent properties also operate in a way which is only part explainable, if at all, by the thing’s composing elements.

The operations of the higher level [of the thing] cannot be accounted for solely by the laws governing the lower-order level in which we might say the higher-order level is ‘rooted’ and from which we might say it was ‘emergent’. … In short, emergence is an irreducible feature of our world, i.e. it has an ontologically irreducible character (Bhaskar, RTS: 113).
Emergence, then, refers to properties that are both new and beyond explanation purely in terms of the ‘laws’ (the ways of acting of things, RTS: 227) relating to the elements which construct the new compound thing. Bhaskar was not, however, the first to use the concept of emergence. Various forms of emergence have been used both in philosophy and in science, the range of which have been outlined in some detail by Cunningham (2001). Despite the variations across the different definitions, all of them agree on one particular point: that to be ‘emergent’ a thing must have elements that exist in some type of relation to one another. It is these relations that make the thing distinct from its unrelated components. After this point, however, disagreements arise when the question is raised of whether structured relations between the elements are necessary for it to be an emergent thing; or whether it requires already complex internal elements to form emergent properties (Cunningham, 2001: S68-S70). The exact debates concerning the constitution and effects of emergence need not detain us here, for it is more fruitful to focus on the argument as developed by critical realists.

Bhaskar’s position is refined by Elder-Vass (2005) who terms it ‘compositional emergence’ (see also Kaidesoja, 2009: 7). Compositional emergence refers to the particular ‘synchronic’ relations that form the entity but also to the ‘diachronic’ properties that emerge out of the synchronous relations. It is these diachronic properties that are emergent because they are properties not already held by the entity’s constituent elements. A good example of this is water. In the binding of the hydrogen and oxygen atoms, the resultant water molecule has emergent properties that are not contained by either hydrogen or oxygen. “One cannot, for example, put out a fire with oxygen [or] hydrogen” (Elder-Vass, 2005: 318).

Where relations between elements do not lead to the emergence of properties distinct from the (if any) properties of the elements, this set of relations can be termed a
‘resultant property’ (Elder-Vass, 2007c: 29, 35, see also 2005: 319). By bringing in this term, Elder-Vass allows for a valuable distinction to made to Bhaskar’s much more ambiguous term ‘compound’. So far, a compound has been used simply to signify a thing which is generated from an event—whether it contained emergent properties or not. However, now when a thing manifests emergent properties it can be termed an entity; this leaves compound free to be used to refer to Elder-Vass’ idea of resultant (i.e. no new properties were produced). By distinguishing the two in this way (entity equating emergent properties, compound equating no emergent properties), it enables a greater accuracy in determining the product of events.

However, by adopting the definition of ‘compositional emergence’ three supplementary discussions are created: the first is in regard to the production and the maintenance of the entity; the second examines the partial environmental independence of emergent entities; and the third develops further still the arguments regarding causal explanation. These three are explored below.

**Consequences of emergence 1: Systems, morphogenesis, and morphostasis**
In looking to understand the production and maintenance of an emergent entity, there are two important concepts which relate to it—*morphogenesis* and *morphostasis*. Developed initially by Buckley (1967) the terms were later expanded along critical realist lines by Archer (1995). Buckley’s argument used systems theory (at that point mostly used only in the new field of cybernetics and computing) as an advance to existing sociology; especially as a means to overcome Talcott Parsons’ then dominant structural functionalism. Buckley made the point that a system is different than a structure: “a *system* is a continuous, boundary-maintaining, variously related assembly of its parts, it is not to be confused with the *structure or organisation its components may take on at*
any particular time” (ibid.: 5). The organisation of particular elements into particular structures can produce a system, which can vary drastically in size and composition.

“Thus, if social groups are not ‘real entities’ then neither are individual organisms, organs, cells, molecules, or atoms, since they are all ‘nothing but’ the constituents of which they are made” (ibid.: 42). As will be discussed in more depth further below, Buckley’s argument is that every ‘thing’ is constituted by particular elements organised in a certain way—and it is this organisation which leads to the establishment of the thing as a bounded ‘system’.33

Buckley produces a very useful argument regarding the different complexity of systems. Put in direct terms, the more basic the system, the more simple its operation; the more intricate the system, the more complex its operation (ibid.: 46). For Buckley, the more complex a system, the more of an open system it is (here we see a difference from Bhaskar’s position, as outlined above: for Buckley, closed and open systems are based on complexity, not simply their ability to exclude other forces). Open systems allow interchanges with the external environment to feed into it, an essential element if the system is to continue existing in that environment (ibid.: 50-51). Closed systems responding to intrusion become chaotic, but open systems are (within certain parameters) able to adapt to intrusions. This, Buckley argues, is one of the key characteristics of humans as compounds of multiple and increasingly complex systems:

...as we proceed up the system levels we find the systems becoming more and more open in the sense that they become involved in a wider interchange with a greater variety of aspects of the environment, that is, are capable of mapping or responding selectively to a greater range and detail of the endless variety of the environment. At the sociocultural level the details of the natural environment

33 n.b. Outhwaite outlines a criticism that Buckley appears to be proposing a slightly “conventionalist” view of structure, but this criticism is dealt with in the wider developments of the concept of ‘structure’ below (Outhwaite, 1983: 141-142).
become subordinate to the social, gestural, symbolic environment which is now mapped and responded to in greater detail as the basis of group life (Buckley, 1967: 51).

The more complex a system, Buckley argues, the more sampled and interpreted the external feedback becomes. It becomes the case that the feedback moves from simple stimuli for basic systems into information (the sampled product of multiple stimuli) for complex systems. It is this ability to incorporate external signals that enables complex systems to maintain the entity they are part of—including adapting it to operate in new environmental circumstances. Buckley terms this development of a system morphogenesis. Morphogenesis is the principle that particular forces are required for an entity to form. It is not enough to have the constitutive elements of an entity simply ‘together’, it is necessary to have a particular set of forces present that form the elements into a relationship vis-à-vis one another. Morphogenesis also implies that a system finds adaptability a necessary requirement in order to maintain itself in response to new environments. These types of relations are found in the “structure-elaborating, deviation-promoting processes that are central to an understanding of higher level systems such as the sociocultural” (ibid.: 59). Morphostasis, by contrast, details the forces necessary for an entity’s constituent elements to maintain their (synchronic) relations between each other (ibid.: 58-59; Elder-Vass, 2005: 324).

The implications from this are, first, that particular entities will not form—despite the relevant elements being present or obtainable—if the necessary morphogenic factors are not active. The second implication is that an entity may form but, due to a lack of morphostatic forces, its synchronic relations do not endure meaning the entity will cease to exist after a given period of time. There are, of course, different morphostatic forces in relation to different emergent entities. The emergence of plutonium-239 from the atomic-fission of uranium, for instance, creates an atom that has a half-life of 24,000 years. The
emergence of an explosion from the detonation of a quantity of TNT, by contrast, dissipates within a few seconds at most.

**Consequences of emergence 2: Partial environmental independence**

Some emergent entities have the capacity to exist in partial-independence from their immediate environment(s). The obvious example are humans who, through using abstract symbolic structures such as language or through the complex organisation of materials into tools and resources, can undertake activities which are only partly determined by wider environmental circumstance. Partial-independence is a subject alluded to by Buckley (1967: 66-68), who highlights the problem of assigning causality to systems (and the entities that they form) precisely because they are complex. In a form similar to Bhaskar, Buckley argues that within systems there can be ‘step functions’, whereby forces have no effect until a component of the system has reached a certain level or point (a parallel to Bhaskar’s ‘tendencies’ and ‘powers’ distinction). There may also be ‘buffer mechanisms’ that either deflect or delay the effects of external forces until a later time. This may have the effect of delaying the effects of a particular cause until quite some time after the event.

Additionally, the more hierarchically complex an entity—i.e. the more ‘levels’ it contains in its constitution—the increasing likelihood that it will have properties through which it can affect itself (at least in some limited capacity). Buckley terms them ‘circular causal chains’ where “the effect of an event or variable returns indirectly to influence the original event itself by way of one or more intermediate events or variables” (ibid.: 69). An emergent property has abilities or effects that are (somewhat) independent of the laws governing the lower level entities/compounds from which it is constituted.

Understanding that emergent properties are not determined by their constituting
elements but by the properties deriving from their structured relations, it means that analyses of natural and social events can account for the seemingly ‘independent’ effects of entities at different emergent levels (Pearce, 2007). The concerted operation of the organs in the human body, for instance, usually endow a human being with certain capacities that are independent of the capacities of the organs themselves—to run, to laugh, to think, etc. However, the emergent entity of ‘a human being’ also has the capacity to destroy itself, to starve itself, to dehydrate itself, to throw itself off a high building, etc. which the individual organs do not have themselves (e.g. the human liver does not independently “decide” to stop or start removing toxins from the blood). The laws in operation that affect the organs of the body do not, in this sense, extend to stop the emergent properties of the human as a whole. The lower levels may constrain higher level operation—humans cannot filter water through their lungs for its oxygen, for instance—but the operation of the human lung does not determine that the human brain cannot develop an aqua-lung, for instance.

Consequences of emergence 3: Causal effects
The second supplementary discussion returns to the question of causal explanation. Elder-Vass (2007c) argues that once a new property has emerged, it is impossible to explain it by reference simply to the entity’s constituent parts. It is possible to refer to the constituent elements in a form of explanatory reduction—“an explanation of how the properties or powers of the higher level entity result from the properties of its parts and the way they are organised” (ibid.: 30, emphasis added)—as this constitutes an account of the mechanism responsible for the higher level property. It is a valid argument to state that each constitutive element of an entity is necessary for its formation (for if the elements were not there in that particular way, how could the entity form?). Importantly,
however, it is *not* possible to explain the emergent property by a simple appeal to the various elements that constitute it. Instead, to “complete [a] causal analysis of the real powers or emergent properties of any emergent entity [it] would include five elements:

(a) a list of its characteristic parts;
(b) an explanation of how these must be structured (i.e. related to each other) to form the whole;
(c) a morphogenetic account of how this comes about;
(d) a morphostatic account of how it is sustained; and
(e) an explanatory reduction showing how the powers or properties or the whole are produced as a result of it having the parts it does, organised as they are” (Elder-Vass, 2007c: 31).

However, explanatory reduction can take two erroneous forms: ‘eliminative reduction’ and ‘level abstraction’ (Elder-Vass, 2005: 322; 2007b: 163-164). *Eliminative reduction* reduces everything to its smallest parts in order to explain higher-level operations. But this ignores the various levels of synchronic relations that give rise to diachronic emergent properties—i.e. an entity is (usually) a pyramid of interlocking entities or compounds, with each level usually consisting of an entity and its emergent properties. As an emergent property is *different than* the properties of its constituent elements it therefore cannot be explained by appeals to the operation of those components. A similarly mistaken view is *level abstraction* where an entity is understood as a simple whole, its complex structuring of constitutive elements either overlooked or ignored. Analysing an ‘everyday object’ like a car, for instance, as a complete object with the property of auto-motion would be a level abstracted view. In fact, a car is a series of complex relations between a multitude of specific parts and relations that either on their own or assembled differently, *do not* have the same emergent property. In order to provide an account of an event, therefore, it requires a *downwardly inclusive view* detailing the “internal stratification” (Elder-Vass, 2007b: 164) and relationships of an entity’s component elements (but not reducing an entity to these elements).
2.2 Critical Realism in Practice

Social structure: Bhaskar and Benton

Bhaskar’s conception of social structure

In the critical realist arguments developed in RTS and PN, Bhaskar elaborates an understanding of both social and non-social structure. He focuses on two distinct areas: structure(s) that constitute emergent entities and social structures more widely.

Bhaskar’s understanding of emergence (outlined above) is that an entity’s elements are structured in a particular way and that it is this (alongside the appropriate conjuncture which the component elements produce) which gives rise to an emergent property (RTS: 113; PN: 20, 39, 81, (esp.) 97-103, 159-60; Elder-Vass, 2005). Bhaskar also places emphasis upon another form of structure, ‘causal structures’ (e.g. RTS: 28, 186-7, 241), which he argued constitutes “the objects of… [scientific] theory” (RTS: 35). When referring to causal structures, however, he is slightly less precise in specifying exactly what elements constitute causal structures. However, he clearly sees them as holding causal mechanisms in the same manner as ‘things’. Causal structures appear to develop throughout the discussion in PN, when Bhaskar moves to call them generative structures (e.g. PN: 80). These imply ‘a structure that generates a property that operates as a cause’—a position very similar to the argument outlined above in the discussion on emergence. It is important, however, to note the generative structures are viewed as being the product of either natural or social processes—i.e. not ‘just’ natural.
In discussing social structure, Bhaskar places much greater emphasis on it in PN than he did in RTS.\textsuperscript{34} In PN (see also Pearce, 2007: 46) Bhaskar makes his first major claim about social structures arguing that:

1. social structures, unlike natural structures do not exist independently of the activities that they govern.
2. social structures, unlike natural structures do not exist independently of the agents’ conceptions of what they are doing in their activity.
3. social structures, unlike natural structures may only be relatively enduring (so that the tendencies they ground may not be universal in the sense of space-time invariant) (PN: 38, emphasis added).

The triple dependencies of activities, concepts, and space-time reflects Bhaskar’s position that these three elements tri-form every social structure—it is only the content and context that changes situation to situation. Bhaskar argues that activity dependence refers to how mechanisms of social structures only ever exist in their effects—i.e. that they are immanent, only ever manifesting when enacted (PN: 50). For Bhaskar, concept dependence refers to the fact that social agents always form related concepts (however inaccurate or accurate they may be) to what action it is that they are doing (PN: 49).

Finally, space-time dependence refers to the fact that both activities and concepts exist amongst other “social activities as conceptualised in experience” (PN: 51)—meaning these activities are sited in particular places at particular moments. Social structures are therefore understood as a conglomeration: agents undertake socially situated conduct that makes manifest social pathways, all the while ascribing meanings (derived from wider social influences) to their conduct. Not only is there a stronger materiality to structure in Bhaskar’s position, it is also the case for critical realists that social structures—when enacted—manifest mechanisms that can causally effect the world.

\textsuperscript{34} In the postscript to PN, Bhaskar argues that in RTS he was undertaking an “immanent critique” of positivism and the philosophy of science; hence his (over)emphasis upon science (rather than society) and upon physics and chemistry as the often used exemplars of ‘science’ (PN: 168).
The important development from this position is that social structure becomes both the ‘consequence of’ and the ‘possibility for’ social action. “Society is not the unconditioned creation of human agency (voluntarism), but neither does it exist independently of it (reification). And individual action neither completely determines (individualism) nor is completely determined by (determinism) social forms” (1982: 286, see also PN: 36). This argument—that social activity takes place within existing structures, yet is also the source of those structures—leads Bhaskar to formulate a model which he terms the transformational model of social action, or TMSA (PN: 34). Social structure is here understood as always pre-existing social agents. Indeed, the very possibility of social interaction presupposes a social structure being present to be ‘social’ within!

Holding a similar line, Manicas (1987/1998: esp. 318-319) argues that Bhaskar’s position is that social structures are part of an immanent historical complexity, constantly renewed through individuals actions, but importantly also have regulatory properties that promote particular actions over others. Social activity is, for Manicas, a process of both ‘making manifest’ existing patterns of social action (structures) but also with the possibility that the same social activity has the capacity to alter these structures by changes to the pattern of that activity (PN: 34). Bhaskar has a similar argument to Manicas, where Bhaskar argues that structural change can occur when two particular types of social forces interact. He terms these two forces ‘systems’ and ‘nexuses’: systems refer to the “combination of structures” and a nexus the “combination of features or aspects (e.g. of an event)” (1982: 279). The culmination of this argument is that what are usually understood to be single, self-generating ‘social objects’ are actually the product of a combination of causes. (This is a further articulation of the ‘real and actual cause’ argument, covered above.) These causes may be the outcome of a combination
at the ‘upper’ level of structural systems or at the ‘lower’ level of the nexus where there is an interaction of effects; both of which may produce an event. The problem, Bhaskar argues, is in determining which level (system or nexus) is the one in flux—or if it is both (‘flux’ implying the interaction of these different elements).

Benton’s critique of Bhaskar
In an important critique of Bhaskar’s conception of social structure, Ted Benton (1981/1998) argues that structure is reduced too far to the level of agential action. Part of Benton’s criticism centres around a paradox: if social structures do not exist except when they are enacted—which Bhaskar terms the “causal interdependency” between agents and social structures (PN: 47)—then how can agents be constrained by structures that are not, at a particular moment, being enacted? This semi-tautology, Benton argues, is an important ontological oversight in the conceptualisation of agents and social structures. It cannot be the case that agents solely constitute social structures because, if that were true, then all powers held by a social structure would be nothing more than the powers held by individual agents themselves (Benton, 1981/1998: 304-305; Pearce, 2007: 47-48). Furthermore, as social structures sometimes manifest powers that are in excess of the individual agents who constitute them, then there must be something particular to social structures that enables the agents who are part of them to manifest these ‘supra-agentive’ powers in the first place.

Social structures, Benton contends, contain powers that (a) are in excess of those powers held by the individual agents of which they consist, and (b) can remain latent and unexercised within that social structure (e.g. the power of the state to deploy the army, to incarcerate individuals within its territorial boundaries, etc.). Under Bhaskar’s criteria if a power is not being exercised then, strictly speaking, it cannot be said to exist: if this is
the case, then how can Bhaskar explain *potential powers* (Sayer, 1992: 119)? Using the above two examples, if none of the individual agents within the structure *inherently* possess the power to command the national army, the power to command the army must, therefore, come from the structure itself. Being cautious to *not* fall into a ‘structure therefore determines agency’ position (which both Benton and this thesis are *not* arguing), it is evident that it is through some *process of enablement* within the structure itself that an individual agent can command the army. (This point will be developed further below.)

Furthermore, Benton argues, Bhaskar overlooks the importance of *coercive* social relations. The argument of *concept dependence* (see above, *PN*: 49) appears to rest on the idea that for agents to successfully form social structures through their actions, they need to have at least some conscious (even if incorrect) conception of what it is they are doing (Benton, 1981/1998: 305-306). Social structure comes about because of a *belief*, however mistaken it may be, that the agent’s actions are ‘meant’ to be done this way (this links into Bhaskar’s argument for the operation of ideology, see *PN*: 49, 53, 65-71). However, as Benton argues: what about those agents who do *not* understand their actions as being informed by their concepts? For these agents their actions are *coerced* into following a particular pattern—and this is not reflected in Bhaskar’s discussion.35

Benton’s reworking of social structure forced Bhaskar to reassess his definition. In a *Postscript* to *PN* (published ten years later in 1989), Bhaskar addresses Benton’s critique and then reformulates his own conception of social structure:

A structure of power may be reproduced without being exercised and exercised in the absence of any observable conflict (i.e. without being manifest)… so long as it

35 This argument is similar to Foucault’s conception of ‘governmentality’—this point will be covered in Chapter 5.
is sustained by human practices—the practices which reproduce or potentially transform it. In this sense the thesis of the activity-dependence of social structures must be affirmed. Social structures exist materially and are carried or transported from one space-time location to another only in or in virtue of human praxis (PN: 174; also quoted in Pearce, 2007: 48).

On this reading, social structures remain the product of human activity (even if human activity must take account of external constraints such as ‘the properties of a thing’, a point that will be returned to later in this thesis). However, it is now recognised that social structures can contain ‘potentialities’ that exist beyond the present actions of their constitutive agents. Activity dependence also explains both the ‘material’ and the ‘transportable’ aspects of social structure: if social structure manifests in the activities of humans, then wherever humans enact a particular social structure then, in essence, that particular social structure is formed (assuming no material objects/things are required). However, this conception raises important questions regarding the form and the regulation of social structures: how do they maintain themselves over time and how might they change? Bhaskar’s TMSA model is helpful in understanding this process, but the later work of Elder-Vass (2007a; 2008a) incorporates both the TMSA and more recent discussions regarding social structure. It is to this topic that discussion will now turn.

Social relations and social structure: Elder-Vass
A problem when discussing social structure, argues Elder-Vass (2007a), is that the terms social relations and social structure are often used interchangeably. This is especially damaging for realist arguments because it blurs the distinction between ‘connections’ or the more formal sense of ‘configuration’. We can adapt from Elder-Vass’ densely-packed discussion the following two distinctions. Relations will be used to mean relations-as-connections (i.e. the simple connections between things). This can include the meta- or
the micro-levels—e.g. between a society’s political and economic formations, or between a dog playing with a ball: both are relations because both are subject to constant change (Elder-Vass, 2007a: 464; Potter, 2003: 197). *Structure*, although seeming similar to relations, can ultimately be defined as structure-as-whole (i.e. the particular and (relatively) enduring configuration of wholes) (ibid.: 465). This means that when using the term ‘structure’ it is implicit that the referent is a configured and formed entity.

In a work published in 2000, Lopez and Scott argue for what they term the “three forms” of (antithetical) social structure: institutional, relational, and embodied (Lopez and Scott, 2000: 19-42, 43-65, 89-107). If the concept of “ontological depth” is used to differentiate the types of social structure—base and superstructure, integrated systems, or fields and space, etc. (2000: 66-88, esp. 70, 78, 88)—there appears a complex picture of what might constitute ‘social structure’.

However, in an argument that rejects Lopez’s and Scott’s adversarial position, Elder-Vass argues that two terms—relations and structure—can be conceptually related to one another using a realist “emergentist view” (Elder-Vass, 2008a: 292). *Relational structure* (which, to avoid confusion and to maintain the distinction just outlined above, we will call ‘organised relations’) refers to a simple organising effect, i.e. the allocation of things to places. Any social group, from a friendship group to a corporation, contains organised relations. However, when turning to address the question of structure, Elder-Vass begins to make a distinction between *types* of structure. Unique to the social world, Elder-Vass argues, is the possibility of *institutional structure* (ibid.: 293). In an institution, the simple organised relations that are present within a pre-existing social group are stronger and act to bind those individuals together into a more tightly defined form. Elder-Vass terms these original groups ‘norm groups’ but later changed this to ‘norm circles’ (Elder-Vass, 2008a; Elder-Vass, 2010a: 122-130). Both friendship groups and
corporations constitute norm circles but the difference, however, is that a corporation has a defined and relatively inflexible set of expectations regarding the conduct of its members; a situation vastly different to what would be expected in the case of a friendship group (where much larger variations in social conduct may well be tolerated) (Potter, 2003). The tightly regulated and delineated framework that is present within an institution (such as a corporation) is what makes it into a structure. It is because of this framework, Elder-Vass argues, that the institution becomes endowed with an emergent property: causal power(s) (Elder-Vass, 2008a: 296). This causal power is the ability to directly enforce the conduct of the individuals who are part of the institution (and so to ensure its continuing structured form).

These relations, when combined with... [the individuals who consist of the] parts, provide a generative mechanism that gives the norm group an emergent property [and a] causal power. The property is the institution, and the causal power is the effect the institution has on the behaviour of members of the norm group (Elder-Vass, 2008a: 291).

The more defined and regulated form that institutional structures produce is because of the consistency it promotes through its ability to regulate the agents of whom it consists. Used in this way the development of relations, institutions, and emergence creates a linkage between common social relations and the particular properties found within social institutions. This critical realist position provides an account of both the generation of social structure and then the effect of social structure. Here, structure is generated through the ‘solidification’ of particular social relations; indeed:

36 Between ‘institutions’ and ‘emergence’, Elder-Vass also includes a variation on the ‘embodiment’ argument which he adopts from Lopez’s and Scott’s (2000) attempt to delineate post-structuralist conceptions of social structure. It is unnecessary for this argument and so is not included here.
Social relations are immensely important to the emergentist position— it’s just that [emergentists] don't substitute them for structure, but instead recognise their crucial role in underpinning [social] structure (Elder-Vass, 2007c: 39).

The effect of this structuring of social relations is to create properties in the structured group that were not contained previously in the more ‘basic’ relational group. The property that is generated is the ability to self-regulate and discipline members of the institution, as well as creating a norm of conformist conduct among its members. In other words, relations develop into structure and structure develops conformity.

Developing the concept of social structure
An interesting development can be made, however, by incorporating into the ‘post-Benton’ Bhaskarian position alongside Elder-Vass’ argument for emergent social structural properties. By doing this, Bhaskar’s transformative model of social action (TMSA) gains much additional strength by integrating Elder-Vass’ argument that social relations can exist at various levels of social interaction.

Using these distinctions developmentally, everyday interactions that are mere social relations can become semi-structured into organised relations. These semi-structured organised relations have a partial impact upon group norms, requiring some level of adherence by group members to relations with fellow members (an example might be keeping one’s promise made to a friend). If semi-structured relations become further entrenched, then they produce institutional relations. These fully-structured institutional relations exert a high level of control over the conduct of the agents contained within them (such as employees in a corporation). At the level of an institution, a social structure utilises elements such as documentation (e.g. a written constitution) and possibly the creation or control of physical structures (e.g. a building within which the institution is sited). However, as Elder-Vass argued, it is at the level of institutionalisation...
that the structure gains the power to organise and control (in varying ways) the conduct of its members; this means it can enforce conformity to norms. The benefit of holding this graded understanding of social structure is that it is capable of encompassing a variety of structural forms. This retains Bhaskar’s insistence that structure is only ever present in its effects, so avoiding the reification of structures, but it can also account for Benton’s position that powers/potentialities can be held without being exercised.

To incorporate both Bhaskar’s and Benton’s positions along with Elder-Vass’, a fruitful way of viewing these structures might be as a series of looped ‘waypoints’. Like certain checkpoints that a runner has to pass if they are to correctly complete a race, semi-structured ‘organised relations’ and fully-structured ‘institutional relations’ begin to compel members to conform to their particular norms, form, and activities. The waypoint analogy retains the agency-focused element of social structure (for deviation is possible: a ‘whistle-blower’ can choose to inform authorities regarding corporate crime, for instance), but it also maintains the idea that there is a defined structure to the institution (meaning the conduct of agents is regulated). Increasing formalisation leads to the increasing structuring of the group producing, in its most defined form as an institution, the emergent ability to exert restrictions and to sanction deviant conduct. The waypoints establish what are the expected routes of agential conduct and, as soon as agents begin to follow these pre-defined routes, a structural effect is produced that forms an institution.

37 To broaden the ‘waypoints’ example an analogy can be made to car headlights moving at night. If a camera was used to quickly take a picture of the moving cars then each headlight would appear as an individual dot. However, if a longer exposure was used (i.e. increasing the time the lens shutter was open) then the lights would appear not as dots, but as a trail. This, I believe, is analogous to the reification of social structure: repeated social actions have the appearance of a definite presence when, in fact, they are just repeated actions following particular waypoints that delineate possible routes of action within a particular institution.
Continuing to focus on the institutions themselves for the time being (external effects will be discussed below), an institution is understood to have “powers” if it has control over a greater number of potential routes of action and is able to enforce the particular conduct of its members (so producing particular institutional effects). Furthermore, the greater the number of resources the institution commands (from the monetary to the human) the greater the internal and external effects the institution can produce. In this way, potential courses of action—pre-defined sets of waypoints—contained as potentialities within the institution can be understood as the latent powers of that institution. The emergent power of regulating its members means the institution can expect its members to undertake particular forms of action within the remit of the institution (and sometimes even beyond this remit).

Two corollary arguments follow from this position. The first is that institutions now appear as a ‘nodal skeleton’ (like the dots in a child’s “join-the-dots” picture book) that, when passing one to another, end up producing the appreciable ‘everyday shape’ of the institution. It is this nodal skeleton that institutional members conform to and which also locks even non-members to if they come into sustained contact with it. To repeat an earlier example, as Sayer argued (1992: 119) “you can’t pay rent to yourself.” This is important because it highlights (a) the inflexibility of the economic structures that incorporate the concept of ‘rent’ (who the rent is paid to is not open to redefinition, i.e. it is not based on voluntaristic action), and (b) that while a person may use their partial-autonomy to withhold their rent, ultimately the landlord, debt collection agency, or maybe finally the state will compel payment along with possible eviction and prison term.

The second corollary position is that institutions can have effects upon more than just those agents contained within them. Many everyday social relations are repetitive. They are repetitive precisely because agents are either members of, or come into
external contact with, social relations at the organised or institutionalised level. And, as will be developed in the chapter on Althusser and aleatory materialism, institutions largely ‘cluster’ around common and regularised forms, meaning many mundane social relations are, for agents, produced in response to organised and institutional forms. For example the everyday experience of buying a coffee, driving on the road, or even teaching at a university, are usually very similar. Even if the particular aspects of content change from instance to instance (e.g. a surly coffee server one day then a happy coffee server the next), both still undertake the same—from the coffee buyer’s perspective—operation: the provision of a cup of coffee for monetary exchange, even if both experiences are slightly different. The regularity of experience is arguably because of the institutional controls exhibited over the conduct of agents within them (such as coffee servers) which produces relatively commonplace experiences.

The voluntary nature of acts such as buying a coffee (I may choose not to purchase one, for instance, and suffer no adverse repercussions) is different to situations where one is compelled (either by law or through necessity) to interact with institutions. As part of an interesting discussion, Benton (Harré and Bhaskar, 2001: 33)\(^38\) poses the question that social structure (in the argument here, ‘institutional relations’) can also become apparent when an agent is “obstructed by rules and regulations which are applied by powerful individuals [e.g. state bureaucrats], who are powerful not because they are individuals with certain personal skills, but because they occupy particular offices in the social system.” If Benton’s account is reworked through the position just outlined, then the structure affects both the bureaucrat and the external agent (e.g. a welfare claimant) who comes into contact with the institution. The institution creates the

\(^{38}\) The point by Benton was a question put to Rom Harré during a discussion between Harré and Bhaskar.
effects of: (a) being a partial constraint upon what the bureaucrat can or cannot do (while operating officially as a bureaucrat); (b) enabling the bureaucrat to allocate or withhold resources (based upon the institution’s rules of conduct and the resources available to it—in Benton’s example, the allocation of social welfare); and (c) the powers of the bureaucrat and the institution impact upon the possible future actions of external social agents (e.g. welfare claimants: can they receive state support or not?).

In this way, it is not just the exercise of constraint over internal agents that gives organised and institutionalised relations their power, it is also their impact upon mundane interactions (e.g. coffee buying) but also with more serious interactions (e.g. the receipt of welfare or not). Linked to this it is worth mentioning that the possible routes of action (i.e. the latent powers of a structure) that an institution is known to possess can appear as physically real, even when they are not being enacted. Structure does only ever physically manifest in the actions of agents, but the more powerful institutions create ‘agents-in-structure’ who have a large range of actions open to them. Where these powers are known—or even where they are only anticipated or even mistakenly assumed to exist—this impacts upon other social agents external to the structure. These potential routes of action open to an agent-in-structure may be enough to impact as though a physical structure was in place. So, keeping in mind Bhaskar’s warning not to reify structural relations, an argument can still be made that accounts for the potential effects of institutions even if they are not actually in operation. Importantly, these potential actions can still be theorised as being real, including their potential impact upon the actions of other agents or institutions.
Agency
As can be inferred from the discussion so far, CR links agency and structure together. Barring highly individualised and relatively mundane actions (such as breathing, walking, picking up an object, etc.), CR understands agents to be empowered to act precisely because they are part of wider social structures. And, as has just been argued, institutions only exist as forms of (albeit heavily regulated) agential action. But this in itself does not fully explain agency per se. (A corollary account of what an agent might be is covered in detail in the discussion on CR and Actor Network Theory, below). Importantly, for CR, agents are not only empowered through agential-interlinkages (e.g. within institutions), they are also empowered through the wider knowledge systems (i.e. discourses) that are present within a particular group/society. All of these points can quite quickly be covered with a brief examination of ‘agency’ as constituted by CR.

In PN, Bhaskar argues that intentional human conduct (behaviour, as Bhaskar terms it) is always motivated by reasons: “intentional human behaviour is caused, and...is always caused by reasons, and that it is only because it is caused by reasons that it is properly characterised as intentional” (PN: 80). Bhaskar’s point is that when agents undertake actions, the agent (or agents) had reason to act in that way. The reason may be false—such as protesting against same-sex civil partnerships because the agent believes them to cause divinely retributive storms and earthquakes—but it is still a reason motivating the action being undertaken. (There are, of course, unconscious or unthinking actions, but these will be discussed below.)

Besides noting that reasons in-and-of-themselves can be motivations for agential actions (a position denied by strict structuralist theorists), human agents are also understood to possess emergent levels of psychological powers (including, but not restricted to, reasoning). Following the emergentist argument, Bhaskar argues that the
synchronic constitution of each cognitive level\textsuperscript{39} produces an interdependent but, importantly, \textit{irreducible} set of powers produced by one that constitutes the next. As the argument concerning \textit{eliminative reduction} (see section 2.1 above) already outlined, it is impossible to explain higher order actions by simple appeal to the constitution of lower order elements or structures. As Bhaskar states “for literally, if it rains, and A opens his/her umbrella or takes any other form of protective or evasive action, the deterministic chain of neurophysiological states is broken” (\textit{PN}: 105). If, for example, one was to explain the action of putting up an umbrella in the rain as a neurophysiological response to getting wet, then as soon as the agent was under the umbrella and out of the falling rain, they would close the umbrella because they were not being rained upon; only to open the umbrella again, then close it again, etc. If the agent maintains an open umbrella while not being directly rained upon, it means that there must be higher-level cognitive operations which are, importantly, \textit{independent} from lower-level cognitive operations.

Bhaskar argues that when explaining social agents, a \textit{double decentring} must take place (\textit{PN}: 112). The first is that there needs to be a dislocation of society from the individual: “the category of the biological individual may be an unsuitable designator for socio-psychological and social psychological analysis” (ibid.). The second is that the mind should be separated from consciousness, this entails that “performances and overt activity become inadequate designators for the cognitive sciences; …it breaks the link, in this domain, between belief and/or ability and \textit{consciousness} of that belief/knowledge of that ability” (ibid.). Agents, therefore, are \textit{not} fully explainable by appeals to either reductionist (neuro-)psychologism or to the argument the actions of agents fully

\textsuperscript{39} The lowest being the \textit{neurophysiological}, the mid-level being the \textit{psychological}, the highest being \textit{social states} (\textit{PN}: 99-100).
represent the thought-out and fully-considered actions that the agent wished to undertake. For Bhaskar, the power of theory to explain agency is based on the idea that an agent *might* have acted other than they did. “An agent is only *free* to the extent that s/he is capable of realising his or her real interests (which means knowing, acting on, and bringing about a state of affairs satisfying [those interests])” (ibid.: 114).

Human agency, for CR, is the interweaving of both physiological (i.e. natural) and social (i.e. discursive) factors. As Pearce (2007: 41) reiterates, CR allows both reasons and beliefs to become ‘causal’ (i.e. motivating) powers that can account for agency. As outlined above, agents can act in response to being *within* an institution or in *response to* an institution’s form, but agents also act *because of* the reasons or beliefs that they might hold. The task of understanding these actions becomes, as Sayer terms it, a double-hermeneutic (1992: 35, 60; 2000: 17). Here the social researcher must actively interpret the interpretations of another social agent—*but*, and here CR differs from a simple Weberian focus upon *verstehen* (“understanding”), agential actions are understood in CR to take place *within a wider context of social relations* that also affect the possible actions of the agent. Accounting for *both* is the focus of CR research.

### 2.3 Actor Network Theory and Critical Realism

It is worth addressing an argument that has a *prima facie* similarity to critical realism. Actor Network Theory (hereafter ANT) is the product of over 30 years of research and argument produced by a number of different researchers; however its main proponent is Bruno Latour. Latour began to establish the framework for ANT with his co-researcher, Steve Woolgar, in their anthropological studies of scientists in their laboratories (discussed further below). However, it is arguably Latour’s body of work that has
consistently focused on developing ANT and it is his retrospective book, *Reassembling the Social* (2005), that offers the most theoretically precise account of ANT.

The first half of *Reassembling the Social* is a retort to criticisms levelled at ANT, while the second half outlines his argument for “how to keep the social flat” (ibid.: 165). It is worth starting with the argument outlined in the second half of *Reassembling*... as it outlines the wider ANT project. Latour’s position is that ANT-style research should consist of three core things. The first is a rejection of all pre-formed concepts (e.g. law, markets, deviance, etc.) (ibid.: 174) and all-encompassing panoramas, which Latour lists as including such works as the *Communist Manifesto* and *The Phenomenology of Spirit* (ibid.: 188). Instead, investigation should be focus on localised ‘oligoptica’, where “sturdy but extremely narrow views of the (connected) whole are made possible” (ibid.: 181). A second aspect is to see every site and every instance not as an independent thing, but to understand it as “the result of the action at a distance of some other agency” (ibid.: 219). After the first two, a third thing is that ‘the social’ can now be seen as a network:

> every locus is now the target of many such activities, the crossroads of many such tracks, the provisional repository of many such vehicles. Sites, now transformed into actor-networks for good, are moved to the background; connections, vehicles, and attachments are brought into the foreground. As soon as we do this, we end up with a superimposition of various canals... entangled and varied... (ibid: 220, see also 128).

And for Latour, this brings the ANT project to completion:

> With ANT, we push theory one step further into abstraction: it is a negative, empty, relativistic grid that allows us *not* to synthesise the ingredients of the social in the actor’s place. Since it’s never substantive, it never possesses the power of the other ['sociology of the social'] accounts (ibid.: 221).

Latour’s argument is a very much welcome attempt to move beyond the ‘science wars’ that pitted social scientists against natural scientists, and positivist against hermeneutist. The focus upon networks (as opposed to structures) supposedly gives ANT the ability to
account for things-as-conglomerates. These conglomerates Latour terms *associations*, and it is through these associations that ANT argues it overcomes the antagonism between ‘single ontology’ natural science and ‘constructivist’ social science.

...we can state as the new default position... that all the actors... might be associated in such a way that they *make others do things*. This is done not by transporting a force that would remain the *same* throughout as some sort of faithful intermediary, but by generating *transformations* manifested by the many unexpected *events* triggered in the other mediators that *follow* them along the line. This is what I dubbed the ‘principle of irreduction’ and as such is the philosophical meaning of ANT: a concatenation of mediators does not trace the same connections and does not require the same type of explanations as a retinue of intermediaries transporting a cause (ibid.: 107, emphasis in original).

For Latour, associations enable ANT to break the dichotomy between the two positions of ‘single ontology’ or ‘constructivism’:

...There is unity and objectivity on one side, multiplicity and symbolic reality on the other. This is just the solution that ANT wishes to render untenable. With such a divide between one reality and many interpretations, the continuity and commensurability of what we [i.e. ANT researchers] call the associations would immediately disappear, since the multiple will run its troubled historical course while the unified reality will remain intact, untouched, and remote from any human history (ibid.: 117).

Associations, therefore, are the means by which ANT looks to overcome the social/natural science divide: if humans and objects come into relation with one another (so forming associations), the resultant and enduring ‘networks’ should be the focus of any piece of social research. In determining the operation of these networks, however, the concept of *translation* is required. Translation, Latour argues, is the “birthplace” of ANT—and which would have been called the “sociology of translation” had the English name caught on (ibid.: 106).
Translation
Developed by Michel Callon in his (1981) study of French industrial, academic, and
government research into fuel cells, \textit{translation} refers to the process by which problems
were amassed, assessed, and distributed to different research communities.\footnote{40}
Translation does not just imply a situation where different interests merely overlap, but
where they are actively integrated into a common structure of goals and shared inquiry.

Considered from a very general point of view, …\[translation\] postulates the
existence of a single field of significations, concerns and interests, the expression
of a shared desire to arrive at the same result. Though translation recognises the
existence of divergences and differences that cannot be smoothed out, it
nevertheless affirms the underlying unity between elements distinct from one
another. Translation involves creating convergences and homologies by relating
things that were previously different (Callon, 1981: 210).

By 1986 Callon was already stating that there was a “sociology of translation,” which was
“particularly well adapted to the study of the role played by science and technology in
structuring power relationships” (1986: 197). In an engaging study of scallops,
fishermen, and three research scientists, Callon outlined the translations that he saw
occurring between the three sets of actors. In his conclusion to the study, he argues that
based on this experience, a sociologist must: (a) be “agnostic” in their reporting of events
(i.e. no reinterpretation should take place of participants views); (b) obey the principle of
“generalised symmetry” (i.e. all reporting and analysis should be done in the same,
privileging no one particular group or form—scientists over fishermen, for instance); and
(c) free association, “the observer must abandon all \textit{a priori} distinctions between natural
and social events” (i.e. there should be no assumption of a boundary between the actors;
and actors should be followed to establish how they “explain their world”) (Callon, 1986:
200-201, 221-222).

\footnote{40} Although the concept itself, Callon acknowledges, he owes to M. Serres in \textit{Hermes 111, La
Translation, therefore, is the means by which Callon attempted to document the “displacements and transformations” that take place during the interaction of scallops, fishermen, and scientists (ibid.: 223). Because the different interests of one group are translated into the interests of another, it becomes easier to chart when transformations and displacements occur. “To translate is to displace;” and it is a “mechanism” through which “certain entities control others” (ibid.: 223-224).

Latour frequently used the concept of translation, in 1999 defining it as:

In its linguistic and material connotations, [translation] refers to all the displacements through other actors whose mediation is indispensible for any action to occur. In place of a rigid opposition between context and content, chains of translation refer to the work through which actors modify, displace, and translate their various and contradictory interests (Latour, 1999: 311).

This is altered again in Reassembling the Social where Latour defines it to be “a relation that does not transport causality but induces two mediators into coexisting” (Latour, 2005: 108). Callon’s and Latour’s understanding of translation, therefore, incorporates the principle that one party’s interests can be activated through the adoption and resulting part transformation of the interests of another party. ‘Co-optation’ might be too strong a term to use (with its implication of the use of force) but it has a similar focus: the inclusion of another party/agent to further one’s (usually frustrated) goals.

In an intriguing account, Latour uses translation in his ANT examination of the activities of the French nuclear physicist Frédéric Joliot and his complicated attempts during the 1930s to maintain his research into nuclear fission. Important moments of translation occurred when, for instance, Joliot has his plans for continued research thwarted (by the aggression of Nazi Germany). Latour links Joliot to Raoul Dautry, a senior French civil servant who later became Minister for Armaments, and whose attempts to entrench France’s national independence were continually thwarted (Latour,
1999: 83). The important moment of translation occurred when Dautry coincides his interests with those of Joliot: national independence through nuclear fission and (possibly) a nuclear weapon (ibid.: 87-89). This was a process, Latour argues, of turning “political questions into questions of technique, and vice versa” (1999: 98). In essence, translation argues that different parties/actors are able to reposition their interests and goals alongside others—or in the case of the scallop researchers—to actually co-opt the other actors into an overarching framework (e.g. ‘you have to work with us if you want to save the scallop fishing fields’). As a purely descriptive tool, translation provides a very intriguing means of showing the struggles, the dynamic twists and turns, and the difficulties and frustrations that occur wherever multiple actors are brought together. Translation will be returned to again shortly.

**ANT and the question of ‘power’**

It is worth briefly working through Latour’s argument in *Reassembling the Social* with regard to how ANT deals with the question of ‘power’. Covered in the greatest detail in the chapter *Objects too Have Agency* (2005: 63-86), Latour continues his argument against accounts of ‘the social’ but also argues vociferously against the concept of power pre-existing social relations. In terms of the pre-existence of different forms of power, Latour is not alone in arguing this.41 It is an important, and valid, point to make that social structures cannot pre-exist the social—e.g. capitalism as a pre-defined structure of power did not ‘pre-exist’ capitalism as social relations. Capitalism was a product of the social relations existing at that time; not brought fully formed and functioning from a

41 In the upcoming discussions on Althusser (Chapter 4) and Foucault (Chapter 5 and 6), both make argument similar to Latour.
distant nether-world and simply ‘dropped into’ social relations.\textsuperscript{42} That this logical point is lost on so many reductionist researchers and theorists is one of Latour’s greatest frustrations. (Although Latour would doubtlessly object to the comparison, this was also Marx’s point in \textit{The Preface}… that “…new superior relations of production never replace older ones before the material conditions for their existence have matured with the framework of the old society” (Marx, 1859/1983: 160-161)—i.e. new social relations do not simply drop from the sky.)

However, Latour gradually loses company the further he moves away from conceptions of ‘the social’ and toward a position that the only thing ‘social’ that exists are humans and objects organised into networks. He argues that social relations in themselves are weak (ibid.: 66, 68) and that to explain those social relations that endure, the researcher must account for the \textit{objects} that are part of these relations. “…What is new is that objects are suddenly highlighted \textit{not only} as being full-blown actors, \textit{but also as} what explains the contrasted landscape we started with, the overarching powers of society, the huge asymmetries, the crushing exercise of power” (ibid.: 72).

Furthermore, because socially there is no real distinction between subject and object (for all ‘subjects’ are continuously intertwined with the multitude of ‘objects’ that they interact with on a continuous basis), the subject and the object should be treated as equivalents by the social researcher. The “agency of all sorts of objects” (ibid.: 76) is repressed by nearly all social theory accounts (except, of course, for ANT) and what is required is a recognition that it is \textit{objects, not social forces}, that perpetuate power relations in society.

\textsuperscript{42} This is not the case, however, when capitalism had already formed in one particular country/culture and was \textit{then} brought into other cultures; e.g. the British “East India Trading Company” and the British imperial exploitation of India.
Power, Latour argues, comes from:

…the mediators, through which inertia, durability, asymmetry, extension, domination is produced and by conflating all those different means with the powerless power of social inertia, sociologists, when they are not careful in their use of social explanations, are the ones who hide the real causes of social inequalities (ibid.: 85).

Latour concludes by arguing that it is not ANT which has failed to analyse power, it is the “sociologists of the social” who have failed. Their failure is because they do not explain how “domination has become so efficacious and through which unlikely means [it has been achieved]” (ibid.: 86). By simply relating power to abstract and ill-defined concepts the real relations (between components of a network) are never examined—and, importantly, the objects that constitute these networks and which are the means of preserving unequal power relations, are left unexamined. In a footnote, Latour states that the tendencies of the “sociologists of the social” have been so overwhelming that even Foucault’s work could not stand immune from it. After his translation into English, even Foucault’s “precise… analytical decomposition of the ingredients from which power is made” was immediately turned into an account that “‘revealed’ power relations behind every innocuous activity” (ibid.: 86).

**ANT and knowledge: facts and artefacts**

Both CR and ANT place considerable emphasis upon explaining the status and validity of ‘knowledge’. As discussed above, CR understands knowledge to be transitive and a product of social relations attempting to inquire into an intransitive reality. Scientific knowledge is further refined in CR by the argument that while science takes place ‘within’ the confines of present scientific practice, it has an opportunity to produce viable knowledge through the establishment of closed systems (i.e. scientific experimentation).
ANT, meanwhile, argues that knowledge is produced—albeit in a slightly different way to other form of knowledge. The best articulation is arguably still found in Latour’s and Woolgar’s anthropological study Laboratory Life (1979/1986). This study describes how scientists produce statements about the results of their laboratory experiments. These statements go through a period of contestation, with one group of scientists arguing for the results’ validity, another group arguing for the results’ invalidity. This culminates in the results’ either being accepted as facts, or disregarded as artefacts.

Statements are initially formed by the attempt of the scientist to produce a statement of truth (i.e. a fact) about an aspect of reality, the ‘out-there’. Within the laboratory setting, the statement becomes subject to a confrontation between scientists over its ‘correctness’ (so making it a fact) or ‘incorrectness’ (so making it an artefact):

The distinction between [out-there] reality and local [laboratory] circumstances exists only after the statement has stabilised as a fact. … To summarize the argument in another way, “reality” cannot be used to explain why a statement becomes a fact, since it is only after it has become a fact that the effect of reality is obtained. … It is because the controversy settles, that a statement splits into an entity and a statement about an entity; such a split never precedes the resolution of controversy (1979/1986: 180, emphasis in original).

‘Reality’, in this sense, never formally comes into contact with statements; reality only ever has a formal relation to facts (never to the always-ever insubstantial statement). But even facts are not sacrosanct once they are established. A key aspect of conflicts in the laboratory is a process that Latour and Woolgar refer to as the “deconstruction of reality… the reality ‘out there’ once again melts back into a statement, the conditions of which are again made explicit” (1979/1986: 179, emphasis in original). In early-ANT this ‘deconstruction’ is important as it forms the process through which scientists (re)create experiments with the express intent of (re)constructing laboratory-based experiences in
order to offer a more detailed explanatory schema of that laboratory experience (and hence to make wider claims about reality).

The concepts of fact and artefact are interesting for two reasons. First, there exists a relationship between the discursivity and social practices of the scientists and the real world that they are investigating. Reality may not always (even usually) correlate to the discursive—i.e. it does not simply ‘fit’ to what is being said about it—but there is some linkage between scientific practice in the laboratory and the assertions made by the scientists. Second, it is also possible that statements can considered facts, yield productive avenues of inquiry, but are later shown to be artefacts. A good example is Benjamin Franklin’s theory of electricity: he considered it a liquid and even though the assumption was later shown to be incorrect, it was accurate enough to enable much fruitful further research (Kuhn, 1962/1996: 14-15, 17-18).

A critical realist response to ANT
Engagements between critical realism and ANT, where they exist, have been muted at best. Of the few sustained engagements (Elder-Vass, 2008b; Fairhurst and Putnam, 2004; Mutch, 2002), only Elder-Vass offers a detailed engagement with ANT. Most critical realists accept that ANT has a very positive feature in that it has a highly descriptive epistemology. Its intense focus on describing the associations between elements that go into constituting networks offers a very rich account of the movements and interactions between these elements. This detail can be used as a strong (descriptive) data gathering procedure for CR analyses—albeit without the associated ANT terminology. By outlining the various actors involved in a particular circumstance, a nuanced account can be produced that charts the intersections, the stoppages, the
deviations, and the supports that are present. ANT provides a very important resource for ‘mapping’ what critical realists would count as ‘events’.

However, ANT’s focus upon ‘mapping’ networks also constitutes a major impediment for it. ANT originally developed from anthropology (CR, alternatively, developed from philosophy) and it seemingly retains a heavy anthropological focus upon the observable actions of the various ‘actants’ (be they human or non-human) that go into constituting a particular network. ANT achieves this by explicitly and purposefully rejecting any investigation into the ontological form of objects. ANT, therefore, is almost a wholly epistemological theory: it is based upon describing events that take place within a network, but not on explaining the objects themselves that interact in networks. As Elder-Vass terms it, for critical realists this appears to be nothing more than “retrodiction without retroduction” (Elder-Vass, 2010b), i.e. describing effects without the difficulty of assigning causality.

To this criticism the ANT practitioner might respond by saying that it is impossible to ever ‘know’ an object (a reiteration of Kant’s argument that noumena are forever unknowable and all humans can achieve are the phenomenological experiences of them). The ANT practitioner might also say that as objects are always situated in one network or another, there is no way of engaging with the object as an independent thing (even the act of investigation requires a network of investigative elements). Furthermore, ANT might argue that it does have an ontology (and to be fair, it does have an ontology). But the problem for CR is that ANT’s ontology goes no deeper and no further than describing the particular arrangements of objects in particular networks at different times. Latour himself argued that ANT is a “negative, empty, relativistic grid” that is “never substantive” (ibid.: 221).
To illustrate the problem with the ANT position, let us momentarily consider a counter-factual: if a nuclear reactor’s fuel rods were swapped for tabby-cats, how could ANT explain the reason why the reactor would not operate to produce nuclear fission? For ANT, it is because the network has the wrong components: tabby-cats do not enable the mediation or translation of all the necessary aspects of nuclear fission in the same way a uranium fuel rod does. However, for critical realists what is importantly implied but never stated in ANT is that tabby-cats-as-things simply do not have the causal powers to produce nuclear fission. It is the cat itself, not the network, that causes the problem.

The ANT position reduces objects to always existing as ‘objects-in-networks’—and while this may be true, ANT is incapable of then taking the essential further step of theorising why particular objects operate in the way that they do. For ANT, it is because things are in networks, for critical realists it is because things possess causal powers that are (dis)enabled by the relations in which they are situated. If ANT argues that objects operate the way that they do because of the network they are in and has no further ontological conception of objects as independent things, then (logically) ANT is then forced to conclude that an object is ontologically different every time it changes network (for it is the network that constitutes it).

Alternatively, critical realists argue that an object/thing has distinct powers that are contained within the thing itself. These are activated (or not) by the relations the thing forms with other things. Networks may start or stop an effect produced by a thing, but it is not the network itself that ‘makes’ the effect. By foregoing an inquiry into the ontological characteristics of the objects of knowledge—critical realism’s ‘intransient things’—ANT must confine itself to an ontologically shallow position as it is unable to distinguish (in realist terms) the empirical from the real (Elder-Vass, 2008b: 462).
This inability to produce a serious ontology that distinguishes between experience, events, and a wider reality confines ANT to describing, in a manner startlingly close to scientific empiricism, a catalogue of occurrences observed by the researcher. Epistemologically, this in itself is not a huge drawback—for observation is an important method and resource for the researcher—but ANT is incapable of giving a detailed theoretical account of why particular actors have capacities that are different than others (all it can do is describe). This is not to say that there is no concept of differentials—indeed, it was Dautry (the high level bureaucrat) and Joliot (the accomplished nuclear physicist) who, together, sustained for a time French research into nuclear fission. However, ANT is incapable of adequately accounting for the empowerment that the being part of the governmental institutions gave to Dautry. Why is it that government has more capacities/capabilities than one of the companies Joliot was also working with? To explain this would require a move into accounting for the capacities that Dautry gained from being part of government (i.e. the synchronic structure, detailed above). This becomes even more stark alongside Benton’s argument that structures can have latent powers but that, even when they are unexercised, these powers can still have effects (e.g. the social welfare claimant discussed above). At best, ANT would be forced into an account that saw connections that only came into effect at the moment of effect—essentially a poorer version of Bhaskar’s original argument for social structure before he refined it after Benton’s criticism.

We can now also return, briefly, to the question of ANT and ‘power’. Latour’s retort to the critics of ANT is that it is they who do a disservice to questions of power, because they are themselves obsessed with abstract (and largely pre-social) notions of ‘domination’ and ‘power’ (ibid.: 63-64). Domination and power must come from networks, they cannot pre-exist and then suddenly stamp themselves onto society. ANT
accounts have to be “very scrupulous in checking whether power and domination are explained by the multiplicity of objects given a central role and transported by vehicles which should be empirically visible” (ibid.: 83).

However (and to reiterate somewhat the position just argued above), to critical realists ANT’s position explicitly rejects even the possibility that there might be wider social relations beyond the immediate networks—e.g. ‘capitalism’. While capitalistic conduct may be observed in the multitude of the oligoptica of networks-as-businesses, ANT is incapable—even if it wanted to—of describing something beyond the immediate site of research. Latour’s sincerity in wanting to move beyond the stale discussions of theoretical orthodoxy is not in question, it is just that his solution reduces all theory and research to an examination of the empirically immediate. Taken with additional theory, ANT could be incredibly strong research; left without theory, it is incredibly weak. To paraphrase Bhaskar’s point: perhaps as an ‘underlabourer to epistemology’, ANT produces interesting and detailed results, but as a replacement for a detailed ontology, ANT is found to be sorely lacking.

A final point is the form that ANT studies take. With Callon’s imploring call that human and non-human objects be treated the same (see also Latour, 1998, chap.6, 2005, chap.5), this section can sum-up with Elder-Vass’ rebuke:

As a literary device… metaphors are stimulating. As a device for provoking the recognition of a gap in conventional sociological reasoning, they are effective. As a methodological requirement for sociological work, they are thoroughly misguided. Scallops don’t negotiate, represent, or betray. Motors don’t become interested in projects or allow or forbid anything. … For critical realists, scallops, motors, and other non-human objects are significant because they have causal powers—just as human agents are significant in sociological explanation because they have causal powers (Elder-Vass, 2008b: 469).
Conclusion
This chapter has outlined the core elements of CR as both a philosophy of knowledge and as an underlabourer to social scientific research. CR’s development of the concepts of open and closed systems and the types of explanation (retrodiction and retrodiction) that are possible in each, were argued to be important compartmentalisations that produce smooth transitions between different types and forms of explanation. The important CR concepts of events and emergence were also outlined and explained, with the intriguing and highly useful implications of emergence being further detailed.

Attention was also given to expanding the CR position in light of both theoretical and practical critiques it had received. Especially important for this thesis were the developments to the concept of social structure. By incorporating a criticism of Bhaskar’s work by Benton, the latent effects of social structures were outlined. This was strengthened by part of Elder-Vass’ ongoing work examining social structures. The two positions were integrated and then reworked into an account of social structure that saw a gradation of different types of social relations becoming more structured as they became increasingly defined. It was argued that this both creates additional powers and pressures for agents internal to the structure to conform, as well as creating environments that affected the actions of external agents too. Linking this to a CR conception of agency, allowed a fuller account of agentive/structured relations to be elaborated. Finally, a critique of ANT was undertaken to illustrate the deeper social and philosophical ontology possessed by CR compared to ANT.

The concepts and arguments developed here in this chapter provide a base for the development of the remaining chapters in this thesis. Both the aleatory materialism of Althusser and the wider work of Foucault will be examined individually at first, references will be made to the concepts as they have been developed in the discussion of CR. Both
Althusser and Foucault both adopt variations of the concepts of events and emergence, and it is part of the task of this thesis to elaborate on how they might be linked closer together—precisely through using CR as an ‘underlabourer’. It is to this expanded discussion that the thesis will now turn with an examination of Althusser.
Chapter 3
Althusser and Aleatory Materialism

Introduction
This chapter begins with a brief examination of Louis Althusser’s (1918-1990) work as a philosopher and as a Marxist. The chapter continues with an investigation of Althusser’s last major theoretical project: *aleatory materialism*. Although unfinished by Althusser and only published posthumously, the argument made here is that aleatory materialism represented a major breakthrough in Althusser’s thought. The significance of aleatory materialism is that it allows for a *materialist* conception of ‘chance’ historical and social change. This aleatory materialist position is then used to re-read Althusser’s and Balibar’s highly detailed accounts of the historical changes that occurred in the movement from feudalism to capitalism. Using the concepts uncovered in this analysis as a springboard, discussion then moves forward with a detailed account of key moments in Althusser’s theory that ‘enabled him’ to think in aleatory materialist terms. Included as part of this discussion is Althusser’s highly complex expulsion of Hegel from the ‘later’ (or ‘mature’) Marx; the crucial concepts of contradiction and over-/under-determination; and his focus of the work of Niccolò Machiavelli—especially Machiavelli’s use of a concept of ‘dispositive’. The chapter concludes with a discussion that brings together these different strands of Althusser’s theory and develops an interlinkage between them and identifies the key concepts to be taken forward for further consideration.
3.1 Althusser’s Philosophy and Marxism
For the few commentators (Matheron, 1998; Montag, 1998; Balibar, 1996; Negri, 1996; Balibar, 1993; Callinicos, 1993; Elliott, 1987; Sprinker, 1987) who are both informed of Althusser’s work and who manage to hold back from launching polemics against him, a relatively clear consensus is held. Althusser’s contribution to philosophy and to Marxism consist of four important developments: (1) his critical re-engagement with Marx’s texts; (2) his exclusion of Hegel—and the ‘mystified’ dialectic—from Marxism; (3) his resultant renewal and reinvigoration of Marxism, including reclaiming it from the vulgarity of Stalin’s positivistic dialectical materialism (the “DiaMat”); and (4) his development of a philosophy for science. Despite these achievements Althusser never achieved a fully rounded theoretical position, and Althusser’s work remained, as Elliott argues in Althusser: the Detour of Theory, “incomplete” and “never forming a ‘whole” (Elliott, 1987: 10-11, hereafter ADT). A partial explanation may be that all this was achieved amidst frequent bouts of severe and deep depressions, resulting many times in long periods staying in psychiatric institutions.

However, there is a terrible incident that marks—and some would argue irredeemably mars—Althusser’s work. In late 1979, in the throws of depression, Althusser killed his wife by strangling her. Hélène Althusser (nee Legotien)43 was a French Jew who had been an active member of the French Resistance; it was while serving in the Resistance that she joined the French Communist Party. After the war ended she become a well-respected sociologist and activist, specialising in urban and rural poverty (Karol, 1980: 94). During the war Althusser himself was a soldier in the French army, but was captured in an early engagement with German forces and spent almost five years in a POW camp; an experience it is not hard to imagine must have

43 However, Goshgarian (2006: xiii) lists her family name as being ‘Rytman’.
contributed to his severe depressions (Johnson, 1981). Declared mentally unfit at the time of the killing, Althusser spent the next three years committed to an asylum before being released; he then spent the remaining seven years of his life moved in and out of the French hospitals. Although he continued his writing, nothing was published during these last years of his life.

Althusser died in 1990. Speaking at Althusser’s funeral, Jacques Derrida recalled speaking to him the day before he died:

I last spoke to him on the telephone… when I promised to come and see him when I got back from this trip [to Prague], his last words were… “if I am still alive, yes, call me and come over, hurry.” I answered him in a jocular tone in order to hide somewhere… my anxiousness and sadness (Derrida, 1993: 241).

Althusser’s work should stand, or fall, on its own merits. But it is worth bearing in mind is that tragedies such as this can cloud or colour the content of what is being argued. To give parallel examples, Nietzsche’s work is slowly coming back from its partial pariah status that was due to his sister’s willing bastardisation of his philosophy in order to ingratiate herself with the Nazi party. Heidegger did support the Nazis, and never outright recanted this support, even after the war’s end. However, both philosophers still (largely) have their arguments taken seriously. Althusser’s mental illness should not detract from the incredibly intricate, focused, and detailed arguments that he constructed—arguments which, as I will outline below, were of huge importance for delegitimising the orthodox Soviet (and ‘Stalinised’) Marxism of (most) European Communism.44 (Indeed, as Collier argues, “the legend of Althusser as the official PCF philosopher” has “bitten the dust” (Collier, 1988: 543).)

44 It is true that Althusser remained a member of the French Communist Party throughout his adult life—and therefore continued, to an extent, to accept Party policy and orthodoxy—and remained so even when other critical thinkers left or were expelled. However, the philosophy that he
Out of the four of Althusser’s contributions raised above, two are dealt with in greater depth further below (viz. Althusser’s re-engagement with Marx, and his exclusion of Hegel). However, it is worth taking time to briefly consider an overview of the other two (the renewal of Marxism, and his philosophy for science). The renewal of Marxism came from an “epistemological break” that Althusser argued was present in Marx’s work (Althusser, 1965/2005b: 34). Althusser claimed Marx had worked to exclude Hegelian concepts (such as alienation) from his theory, realising that they contained both an implicit humanism (i.e. they reified humans into the ‘makers and doers of history’) and that they contained Hegel’s inherent teleology (the “negation of the negation,” explained in more detail below). The ‘break’ began, Althusser argued, with Marx’s *Theses on Feuerbach*, accelerating through *The German Ideology* (Althusser and Balibar, 1968/2006: 37), and ultimately coming to rest in the mature Marx of the *Critique of Political Economy* and then *Capital*. The shift, Althusser argued, was in Marx’s changing focus: moving away from the essentialism of Hegel’s philosophy (discussed below) to emphasise, instead, the entirely different object of *social relations*.

This stripping out of Hegel from Marxist thought opened up the possibility of a much more detailed *materialist* basis for Marx’s work. An example of this is ‘Analytical Marxism’ which Callinicos terms “especially philosophically fertile” and which is “a truly post-Althusserian Marxism” (Callinicos, 1993: 43, see also ADT: 6). Indeed, as G.A. Cohen (the ‘founder’ of Analytical Marxism) stated: “Louis Althusser has had a strong effect on current interest in historical materialism… Althusser’s *For Marx* persuaded me that the abidingly important Marx is to be found in *Capital* and the writings preparatory to produced was anything but orthodox. As Elliott sums up: “To those… who still wish to insist that in the first or last instance, Althusser was a Stalinist, it might be replied à la Sartre: Louis Althusser may have been a Stalinist; but not every Stalinist is Louis Althusser” (ADT: 338).
it” (Cohen, 1978: x). Although as Cohen then goes on to state (n.b.: a position that this thesis does not support): “But when I passed on to *Reading Capital*… I obtained little from the essays by Althusser, beyond a sense of how elegantly—and evasively—the French language could be used” (ibid.). As is discussed below, the extraction of Hegel allowed Marx’s (later) analyses to rest on the real material conditions that individuals experience rather than the mélange of idealism that lurked behind a proto-materialism. Althusser’s final expression of this non-Hegelian materialism is that ‘we only ever exist in conjunctures’ (a point developed in detail below).

The other outcome, Althusser’s contribution of a ‘philosophy for science’, is understood to be highly important (even if highly problematic). His initial concept of science—as the “axiomatic scientificity of Marxism”—changed during the course of his writing but, as Elliott states, it still “cannot be championed today” (*ADT*: 11). Indeed, as Hindess states, Althusser’s “insistence on theoretical rigour” left his theory (relatively) powerless against its detractors (Hindess, 2007: 9). Althusser saw Marxism as the (literal) ‘science of history’ because it was capable of analysing “the differential nature of theoretical formations and their history, that is, a theory of epistemological history, which is Marxist philosophy itself” (Althusser, 1965/2005b: 38; see also Althusser and Balibar, 1968/2006: 184-190). Althusser argued that by using Marxist concepts and theory, it is possible to finally understand the motors that drove history (see *ADT*: 88). Altering elements of Gaston Bachelard’s (a French philosopher of science) theory, Althusser argued that scientific knowledge is “irreducibly conceptual, [and is] initiated by an ‘epistemological break’ that separates it from common sense knowledge” (*ADT*: 92). The crucial difference—and why Althusser argued Marxism should be understood as a science—is that the *objects* of knowledge are conceptualised in completely different ways: ‘common sense’ knowledge is based on nothing more than everyday experience,
which is inexact and changes in line with circumstance; scientific knowledge, meanwhile,
constructs objects out of and then retains them within its own conceptual system (ADT,
92; also see Althusser, 1965/2005: 182-186).

Even though the position was doomed to failure, the effect of Althusser’s position
for Marxism was to disentangle the concept of ‘science’ from extra-scientific interests.
Crucially he achieved this without lapsing into a crude positivism (ADT: 103). Althusser
had opened the door to the argument that scientific knowledge was a separate
epistemology and not part of “State, Class, [or] Party” (ADT: 108). This separation of
scientific and non-scientific knowledge meant that Althusser (and others) had a means of
arguing against the predominant strains of Stalinist ‘DiaMat’ that were Communist Party
orthodoxy at the time. Science was also portrayed as an evolving and changing subject
and it had to discover new things or it would simply become a “dead dogma” (ibid.). The
incompleteness of Marxism was, for Althusser, its saving factor: there was still much
work to be done. However, even for theorists who were not card-carrying Communists,
Althusser’s theory (both the emphasis on science and his wider arguments) were
important. In an interview with Gregory Elliott, Roy Bhaskar states that: “Althusser was
‘the foremost Marxist influence’, on a Realist Theory of Science” and Althusser
constituted the “best and most advanced Marxist for the philosophy of science” (ADT:
fn.6 330-331).

Althusser’s philosophy can be understood to constitute a complicated series of
refinements to Marxist philosophy—resulting, ultimately, in creating the space for a new
version of it altogether (i.e. a Marxism without Hegel).\(^45\) It is worth quickly stating key

\(^{45}\) Although it is worth noting that Balibar (1996) argues that Althusser was (ultimately) unable to
do away with some concept of ‘alienation’ being the reason why exploitation of workers should be
resisted. If there is no alienation, there where does the moral imperative reside in Marxism that
elements of Althusser’s argument, however, as this gives context for the later discussion. By rejecting Hegel’s concept of society as a “totality” (Althusser, 1965/2005: 102), replete with its morphing and unfolding as it rediscovers knowledge about itself, Althusser instead conceived of society being a “complex whole,” or a “structure in domination” (Althusser, 1967/1990: 219). This alteration of Hegel’s position was achieved by Althusser’s argument for the ‘complex whole’ to consist of various structures that interlink and interrelate and which, when taken as a whole, give the form and ‘shape’ to a society. For example, a feudal set of productive relations gives a very different form to society (to families, to education, to commerce, to government, etc.) than industrial capitalist productive relations. For Althusser each of these structures are separate from each other; and many exist in antagonistic relations vis-à-vis one another. The most severe of these antagonisms are inherent in the actual form of the structured relations (e.g. in capitalism: capital and labour), these Althusser terms ‘contradictions’. It was the antagonism from these contradictions that could (possibly) lead to enough instability in social relations to open up the possibility of social transformation.

Discussed in the following section, this movement toward a defined and delineated materialist conception of society led to Althusser outlining a fully materialist account of social change: aleatory materialism. ‘Aleatory’ means ‘chance’ and it appears strange for a Marxist philosopher to take this position and Althusser died before fully completing his full argument for it. From what he did outline, however, the chance encounter and potential crystallisation of social structures begins to form a pattern of like-attracting-like. So, it is not a case that ‘anything goes’ (although anything remains possible), but it is something is wrong in the capitalist mode of production? Balibar states that one option may be in the unbearable nature of humans being treated as commodities (1996: 117), but even this seems to imply some level of essentialism.
more that ‘we exist only in present conditions’. It is this current conjuncture that is the primary unit of analysis, not grand historical plans or explanations. And the philosopher/social scientist should examine how social structures and social relations change over time, (dis)allowing other structures to form around them. In this way, particular social relations can come to dominate, exerting a ‘freezing’ influence on possible change—and it is only by destabilising these ‘crystallised’ relations that large social change becomes possible. It is to this aleatory materialism that this argument now turns.

3.2 What is Aleatory Materialism?
Althusser’s argument for ‘aleatory materialism’ was posthumously published in a work titled The Underground Current of the Materialism of the Encounter (Althusser, 1982/2006, hereafter UCME). In it, Althusser rejects historical and philosophical accounts that view history as containing either a supra-historical transcendental subject (be it God or ‘Man’) or a telos that underpins/directs the movements of history toward a pre-determined End. History occurs instead, Althusser argues, as chance encounters between different elements that may, sometimes, ‘take hold’ and create new natural and social structures.

Althusser begins his argument for aleatory materialism by going back to the Ancient Greeks and Epicurus’ notion of atoms falling in a void (UCME : 168). Epicurus argued that it takes only one ‘swerve’—which Althusser terms a ‘clinamen’—for one atom to hit another; it is from this chance encounter between the two atoms, the ‘deviation from a straight trajectory’, that creates a series of subsequent random encounters that, ultimately, begins to form basic natural structures. Using an analogy of the formation of ice, Althusser argues that elements are continually moving and coming into contact with
one another, but they only form into something new when they ‘take hold’ and it is at this point that they crystallise (which Althusser terms ‘prise’) into a new structure (UCME: 170, 191-2). Importantly, it is only after crystallising that the new structures begin to produce effects. For aleatory materialism, the natural and social world is the product of multiple chance encounters but it is only subsequent to the formation of these chance structures that they begin to produce influences and powers—importantly, it is through the semi-permanence of these structures ‘continuity’ is experienced as ‘natural’ and ‘normal’.

This seemingly innocuous position allows Althusser to argue that the world, ultimately, is nothing more than the product of these ‘chance encounters’. There is no guiding thread, no force that creates the world, there is “no Meaning, neither Cause nor End nor Reason nor Unreason. The non-anteriority of Meaning is one of Epicurus’ basic theses, by virtue of which he stands opposed to both Plato and Aristotle” (UCME: 169). Emphasising this position is important because it firmly establishes the link between knowledge and the world ‘as it is’. Althusser argues that although the world-as-it-exists is an “accomplished fact” and which now (apparently) contains Reason, Meaning, Necessity and End (ibid.), the world was still formed though a process of chance encounters. If those chance encounters were to reoccur, the world would most likely not be in the form that it currently is—it would be very different and would therefore contain significantly different knowledge(s) that developed in regard to it. By specifying this linkage, Althusser makes an argument that knowledge is created within the boundaries of the established world and is not gained from any external, enduring source.

46 But Althusser is not making an ontic fallacy, whereby whatever the structure of the object ‘is’ then forms knowledge about it. If this were the case, then knowledge would change in direct correlation to the changing form of the object. Althusser is, instead, arguing that knowledge has been produced within a particular set of structures, a la Bhaskar in section 2.1.
Therefore, the appearance of enduring structures and ‘truths’ are just that, *appearances*. Knowledge is linked to the chance encounters that happen to now structure the world.

To give a more slightly more concrete example, Althusser likens the aleatory materialist philosophy to “catching a moving train” (*UCME* : 189). Aleatory materialism rejects the notion that there is one particular *beginning* (Origin) that the world is moving from—or one particular *route* (*telos*) or *destination* (End)—but instead sees the world as a product of multiple encounters and events that continue to occur regardless of almost all other things. The world is comprised of multiple structures and objects that are continually in motion and, for Althusser, with humans having very little influence upon it. The moving train analogy illustrates how inquiries into the structure of the world (in this instance, the inquiring aleatory materialist philosopher) can only generate knowledge relative to short periods. By analysing the world the philosopher comes to understand only a few of the multiple events that are taking place and, even then, cannot know precisely what preceded them or what lies ahead of them (ibid.). This is the aleatory materialist warning against a tendency prevalent within social theory—and one which must be resisted—to ‘fill in the gaps’ between events. As Pearce (2001: 40; n.b.: Althusser, 1987/2006: 263) argues, it becomes quite easy for the unaware investigator to ascribe ‘causality’ to unrelated secondary factors, thereby missing the actual chain of causation.

However, the aleatory materialist position should *not* be understood to reduce all explanatory inquiry to meaningless random encounters. Even if the idea of a ‘guiding force’ (in the form of a *telos*) has been firmly rejected, analysis can still be made of the
immanent forces that are produced from the structures that constitute present relations. Althusser argues that there is a four-stage process to aleatory structures. First, and borrowing from Wittgenstein as well as Epicurus, Althusser argues that there must have been a period of ‘the Fall’ (UCME: 190). Prior to structures forming, there was an initial moment/period of flux and uncertainty, where no relations and elements have yet attained a definition. Second, ‘the encounter’ occurred where elements initially came into contact with one another (Althusser’s ‘clinamen’). This is the real ‘aleatory’ formation of structures.

Where structures are formed, which constitutes the third event, Althusser terms this the ‘taking hold’ (or the ‘prise’) (UCME: 191). The structures that develop through chance encounters begin to amass and constitute wider and wider types of natural and social relations. Once structures begin to form, they then operate as further ‘hooks’ for other similar elements which become ‘entangled’ (Althusser uses water becoming slowly bonded to existing formations of ice as an example).

What one must call an affinity and a complementarity [complétude] of the elements that come into play in the encounter; their ‘readiness to collide—interlock’ [accrochabilité], in order that this encounter ‘take hold’, that is to say, ‘take form, at last give birth to Forms, and new Forms—just as water ‘takes hold’ when ice is waiting there for it, or milk does when it curdles… (UCME: 191-2, emphasis in original)

Finally, the primacy of Being becomes paramount. The atoms/elements constitute “assignable, distinct, localisable beings endowed with such-and-such a property (depending on the time and place); in short there emerges in them a structure of Being… that assigns each of its elements its place…” (UCME: 192). For aleatory materialism, it

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47 This is not to imply that epistemic privilege is possible merely because the inquirer is situated within a particular set of relations. Rather it is that crystallised structures do produce effects and some of them can be determined through measured and rational inquiry. This point will be developed below in Althusser’s discussion of the capitalist mode of production.
is the existence of structures that gives structure to the world—and if those structures were different, then the world would be too. If the atoms/elements were arranged in a different configuration, then the structures would be different and then both the operation and the understanding of the world would also be different. There is no background order ‘behind’ the structures themselves—there is not a global or universal blueprint or set of specifications that all objects are designed to ‘fit’. This is why the contingency of these structures becomes such an important philosophical position: if they change, then the world also changes. Furthermore, this “puts discourse on the world for ever in second place” (ibid., emphasis in original); meaning that for aleatory materialism the world is separate from discursive understandings of it. (Again, a very similar concept to CR's ‘transitory’ knowledge argument.)

Three implications follow for any investigation using aleatory materialism. The first is that any thing or object that exists must have been formed by these processes—nothing ‘pre-exists’ its existence, biding its time, ‘waiting’ to come into being. Everything that is a Being must have already gone through the process of an ‘encounter’ in order to come into Being (ibid.). Second, that there are encounters only produced as the result of multiple causes and effects, what Althusser terms a ‘series’. It is not the case that all things form from one ‘simple’ encounter, rather there are structures that can only arise out of a series of encounters, all of which yielded a particular result that allowed the next to form (UCME : 193, 277-8). Finally, every encounter is aleatory, both in cause and effect. For Althusser, effects are conditioned by the aleatory circumstances just as the causes leading up to an encounter are also aleatory (ibid.).

Indeed, it is in discussing this last point that Althusser argues for the dual principles of necessity and contingency to be understood as key in the development of structures. Necessity because without certain elements an encounter could not have crystallised;
contingency because chance is the prime element in bringing all of the elements together in one place at one time. If a philosopher wishes to analyse the development of a thing, then a process of *retroaction* must be employed. By working backwards from an established thing/structure it is possible to isolate and identify the particular events and encounters that must have taken place during its process of ‘becoming’ that eventually brought that thing/structure into Being (*UCME*: 193-4). It is here that the *necessity of circumstance* can be seen as being so important in the production of a thing/structure.

Althusser also argues that this is the process that gives the world meaning:

This shows that we are not—that we do not live—in Nothingness [*le Néant*], but that, although there is no Meaning to history (an End which transcends it, form its origins to its term), there can be meaning in history, since this meaning emerges from an encounter that was real, and really felicitous—or catastrophe, which is also a meaning (*UCME*: 195, emphasis added).

However, Althusser takes care not to imply that once the world (which is the sum of what ‘already exists’) has established a set of structures, these structures then give permanent and definite sets of ‘laws’ (ibid.). While there certainly are *effects* that are generated by things/structures, there is no certainty to the *endurance of* either the thing/structure or its effects. The continuity of structures can be quickly broken. It is a mistake to understand structures as necessarily following a trajectory that sees their effects manifest, maintain themselves, and then fade away (a simple simile to birth, life, and death). Instead, Althusser argues that laws can change “at the drop of a hat, revealing the aleatory basis that sustains them, and can change without reason, this is, without an *intelligible end*” (*UCME*: 195-6, emphasis added).

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48 This is a very similar point to CR's *retrodiction*—i.e. the detailing of how an event came to occur.
He likens these moments of “radical instability” (UCME: 195) to the dice in a game “thrown back on to the table unexpectedly, or the cards are dealt out again without warning” (ibid.: 196). With no hint of irony, he makes a link to the madness of Friedrich Nietzsche and Antonin Artaud as two examples of moments that redefined the structure of their thought: their very constitution as individuals was shattered and then brought back together again—albeit in a different, post-madness, form. He also alludes to the huge social changes of the French Revolution—ultimately bringing Napoleon outside Hegel’s window in Jena (UCME: 196; Hegel, 1806, in Smith, 1989: 96)—and the Russian Revolution of 1917. During these instances, established social structures were broken apart into a mixture of separated elements and partial structures that had ‘broken free’; it is the new combination of these components that subsequently reformed into the things/structures that came to be Revolutionary France and Russia. However, by examining the analysis offered in Reading Capital (1968/2006) regarding the change from feudalism to capitalism, a more detailed account of aleatory materialism can be made.

3.3 Aleatory materialism and the capitalist mode of production
To conclude his outline of aleatory materialism, Althusser analysed the aleatory nature of the change from feudalism to capitalism. By focusing on this event, Althusser enabled a comparison to be made to an earlier work he completed with Etienne Balibar: Reading Capital (1968/2006, hereafter RC). In RC, Balibar undertook an extended analysis of the change from the feudal mode of production (FMP) to the capitalist mode of production.

49 Given that Althusser was writing this manuscript after spending two years in the Soisy-sur-Seine asylum for killing Hélène, his wife.
50 Althusser called these ‘survivals’, borrowing the phrase from Lenin (Althusser, 1965/2005: 114).
Wishing to avoid the crude reductionism inherent in vulgar historical materialist accounts, Althusser concludes his outline of aleatory materialism by arguing that it was the chance encounter between the “owners of money” and “the proletarian, stripped of everything but labour-power” (UCME : 197) that enabled wage-labour relations to come into existence. It is by chance that this encounter ‘took hold’ [prise] and formed new social relations. It is quite possible, he argues, that these particular relations were present in other times and spaces, but there was never a corresponding prise moment. Citing 1500s Italy as an example, he argues that there were nearly all the elements found in a capitalist mode of production (i.e. wealth and technology, their concentration in the hands of a small elite, and a large and landless workforce). Importantly, however, there was no ‘Italy’ to speak of at the time, there were only warring ‘statelets’. The consequences of this were that there was little or no assurance or security (in a Hobbesian sense), and that there was no market of ‘Italian’ consumers large enough to support the development of large-scale production (UCME : 198). However, the circumstances found in England in the mid-1700s did bring together all the necessary elements together in one place at the same time—and that, ultimately, culminated in the first case of the establishment of industrial capitalism.

Althusser and Balibar: the development of capitalism
Althusser’s argument echoes aspects of an earlier account by Balibar in Reading Capital (Balibar, 1968/2006: 199-308). Here, Balibar developed a detailed argument tracking the transition from feudalism to capitalism and placed special emphasis upon the existing social relations from which capitalism first emerged before establishing itself as a new

51 “Wage-labour” has significance because it is unique to the capitalist mode of production, a point that will be elaborated further below.
mode of production (MoP). Similar to Althusser’s argument that an ‘accomplished fact’ cannot be used to explain its own process of “becoming-accomplished” (UCME: 199-200)—i.e. an effect or outcome cannot be its own cause (for as it did not previously exist, it could not have been present to ‘cause’ itself)—Balibar argues for the immanence of social structures, social relations, and their effects. The capitalist mode of production (CMP) was neither an historical inevitability nor was it ‘waiting’ in the wings to ‘happen’.

Balibar states that when investigating a MoP, a theorist must be conscious that:

…the analysis of the productive forces does not arise as a technical or geographical preliminary, formulating the conditions or bases on which a ‘social’ structure of human institutions and practices can be constructed, as an essential, but external limitation imposed on history: on the contrary, it is inside the definition of the social structure of a mode of production (no definition of a ‘mode of production’ can be regarded as satisfactory unless it includes a definition of the productive forces of that mode of production); it therefore completely transforms the meaning of ‘social’ (RC: 247, emphasis in original).

In other words, the forces and structures that ‘constitute’ a MoP are found within that MoP itself. It becomes the task of theoretical modelling—backed by empirical inquiry—to explain the circumstances that enabled the development of the particular social relations that then form a particular MoP. Therefore, it is a question of identifying the factors that enabled the transition from one MoP to another, and not to make the mistake (as even Marx did at times, Althusser argues (UCME: 202)) of taking the accomplished fact as being its own cause.

Althusser identifies two contradictory explanations within Marxism for the emergence of the MoP (UCME: 197). The first explanation (and the one in which Althusser finds value) is found in Engels’ Condition of the Working-Class in England, in

52 This is the crude reductionism Althusser’s and Balibar’s accounts are at pains to avoid; at best, this argument is nothing more than a materialist reworking of Hegel’s teleological account of ‘History’.
Capital’s section on ‘primitive accumulation’, and in the theory of the Asiatic MoP. The second (and less sophisticated account) is found in Capital’s discussion of the “essence” of capitalism and of the FMP and the CMP, and finally also in Marx’s theories of the transition from FMP to CMP. For Althusser, the first account offers a precise and detailed explanation of the complex social reformations and interactions that led to the development of the CMP.

I am repeating myself, but I must: what is remarkable about the first conception [of the CMP], apart from the explicit theory of the encounter, is the idea that every mode of production comprises elements that are independent of each other, each resulting from its own specific history, in the absence of any organic, teleological relation between these diverse histories. This conception culminates in the theory of primitive accumulation… (UCME: 199, emphasis in original).

Althusser’s aleatory analysis of the transition from FMP to CMP begins with his argument that the dominant feudal class in England were able to absorb the new landless, property-less, labourers into a new form of generalised production. This was achieved through the clustering of individual tools of production in large workshops, something that the Italian proto-bourgeoisie, described above, were unable to do.53 Althusser’s argument is that it is this chance encounter which first established the set of relations that later formed into the much more rigid social relations of the CMP. The combination of new technology, a concentration of wealth, a workless labour force, and a very large (although at that time still only a ‘potential’) national and colonial market, was enough for Britain to first form a CMP in the mid-1700s.

Balibar’s analysis gives flesh to the more skeletal account offered by Althusser. Balibar argues that transition from the FMP into the CMP can be understood through the “genealogy” of primitive accumulation (RC: 279, 281). Through charting the drastic

53 There is an intriguing similarity to Foucault’s argument for the abilities and uses of dispositifs ['social apparatus'] here that will be expanded upon later in Chapter 5.
changes in how different elements are related to one another that the transition begins to become clear. Alongside the elements outlined above by Althusser, Balibar turns his focus toward the growing fragmentation of the (re)productive capacities of the FMP. A tension was created in the FMP—which alongside the serfs, it should not be forgotten, contained a small but significant class of petty-commodity producers—when the link between serfs and agriculture was broken by the land enclosure acts (most likely in order to farm increasing numbers of sheep for their valuable wool) and the link between petty-commodity producer and their means of production was also ruptured (UCME: 199; RC: 280; Marx, 1867/1990: 874-875).

For Balibar, it is both the recombination of existing elements and the alteration of the structure which links elements in relation to each other which constitutes the transition from FMP to CMP. This culminated, he argues, in the development of the “machine-tool.” Despite an already existing complex division of labour between workers, it was this (aleatory) element that proved the decisive shift in relations between worker and tool (RC: 239). Suddenly, the worker was removed from any form of (semi-)skilled labour and was, instead, only required to watch over the productive capacity of the machine itself.

The machine-tool makes the organisation of production completely independent of the characteristics of human labour-power: at the same stroke, the means of labour and the labourer are completely separated and acquire different forms of development. The previous relationship is inverted: rather than the instruments having to be adapted to the human organism, that [human] organism must adapt itself to the instrument (ibid., emphasis added).

The deskilling of the artisan/petty-commodity producers, the ejection of serfs/peasants from ancestral farmland, the concentration (i.e. “primitive accumulation”) of money into the ownership of a small class, and then, finally, the ability to industrially mass produce goods, were factors that all together enabled the construction of the CMP.
Balibar: the crystallisation of the capitalist mode of production

An important aspect of Balibar’s account is that he offers a convincing explanation for why the CMP was able to (in Althusser’s aleatory materialism term) ‘take hold’ [prise]. The crucial factor here is the movement from ‘formal’ to ‘real’ subsumption of the proto-proletariat by the proto-bourgeois class. The important move, Balibar argues, comes when relations change from the initial employment of labourers by the capitalist to those relations becoming reproduced after the first deployment of the machine-tool (RC: 303).

The ‘formal’ subsumption of labourers occurs with their seemingly “accidental” employment within factories after the capitalist has bought control over the (still individualised, still crafts based) means of production. Here labourers could, if only potentially, re-establish themselves as commodity producers if they had the funds to purchase their own means of production (RC: 303-4). This, for Balibar, is one of the key points in the transition from FMP to CMP: ownership is already increasingly concentrated in the hands of one small class, but it is still possible that the labourers could support themselves.

The moment of ‘real’ subsumption occurs with the introduction of the machine tool. Here, the worker is suddenly systemically bound to their social position in two distinct ways: (1) they have been removed from ownership of the means of production (as was the case in ‘formal’ subsumption); but now also they are (2) unable to return to craft-manufacturing. They are unable to return because the new machine-tool based manufacture produces commodities at such extreme volumes that the small hand-crafted manufacturer is left unable to compete (RC: 303).

54 That is, craft-workshops containing, for instance, multiple individually operated spinning-wheels.
Importantly, Balibar argues that it is only when the new social relations first successfully reproduced themselves that the CMP is actually established. During formal subsumption the CMP had not formed (for it was still crafts based, petty-commodity production) and there was always the possibility of labourers returning to their own means of production. In the technological shift that brought in industrial, rather than crafts based, production, this developed an initial (and largely unacknowledged) change in social relations that destroyed the possibility of crafts manufacturers owning their own means of production. When the first cycle of capital was complete (i.e. surplus-value was extracted from the new wage-labour relation between proletariat and bourgeoisie) and then used to re-establish the relationship, it was at this moment that the CMP became established as a full MoP (RC: 262-3).

Working Althusser’s aleatory materialist account into Balibar’s, this moment—when the first cycle of machine-tool production appeared—was when the prise occurred, crystallising the new social relations into an enduring form. The crystallised social relations that ‘constitute’ the CMP include, for Balibar, not just new productive competition (machine tool vs. craft based), but also a new relation regarding the ‘individuality’ of labourers. Previously, ‘to labour’ meant to individually possess certain skills and abilities (either trained, as in a carpenters apprentice, or gained from experience, such as scything a field of corn); but with the advent of machine-tools the labourer became instead a homogenised and generalised worker, needed only to service and aid the machine. It was the machine itself that now became the producer, no longer were workers employing machines in order to aid the workers themselves in the act of production (RC: 252). The reconstituted social structure actively reconstituted elements within it (in this case the ‘workers’ as elements) precisely because their relations to other elements had changed. The workers themselves have not changed—i.e.
ontologically/physically they were still the same—but their constitution as part of the wider social structure suddenly changes their capacities and powers.\textsuperscript{55} The recasting of individuals signals a moment of \textit{rupture}, a move from “production as an act, the objectivation of one or more [individual] subjects, to a concept of production without a subject, which determines certain classes as its peculiar functions” (\textit{RC: 268}). For Balibar, an entire group of subjects suddenly become caught in social relations that operate to restructure their possible actions; trapping them in a new set of social forces and pressures.

It is these structural changes that both Balibar and Althusser argue produce the ‘histories’ and meanings that are specific, discontinuous, and localised. For Balibar, each structural change creates new social relations—and contained within these combinations a specific history is developed.

We can... say that each of the elements of the combination undoubtedly has a kind of ‘history’, \textit{but it is a history without any locatable subject}: the real subject of each component history is the \textit{combination} on which depend the elements and their relations, i.e. it is \textit{something which is not a subject} (\textit{RC: 250}, emphasis in original).

Balibar continues:

What Marx is reflecting here is quite simply the operation I was trying to explain at the beginning... to reduce the \textit{continuity} of history, on which is based the impossibility of sharp ‘breaks’, and to constitute history as a science of discontinuous modes of production, as the science of variation (\textit{RC: 257}).

In Balibar’s work it is important to note that he understands each combination of elements (and the resulting social relations) as \textit{reconstituting} the elements contained with it. As there is never a period when social relations are \textit{not} present—even, as has just been examined, during times of social transition and change—all objects and

\textsuperscript{55} This theme is developed later in the chapters on Foucault, especially in section 5.3.
subjects ("elements") are constantly part of a wider social structure that acts to ‘place’
them vis-à-vis other elements within that structure. In short, there is no “hiatus” in social
relations during times of change (RC: 273). It is this inclusion within a wider structure
and ordering that imbues elements with a number of their properties.56

Althusser’s later aleatory materialist position is similar to Balibar’s. As was stated
earlier, Althusser argued that there is no meaning to history (no telos, no End, etc.), yet
there can be meaning in history (UCME: 194). When the elements of social relations (in
Balibar’s sense) re-form through a series of chance encounters into something new, they
produce their own different history. As Althusser states, “[a] mode of production is a
combination because it is a structure that imposes its unity on a series of elements”
(UCME: 203). As a unity—which is the product of a structured relationship—the various
elements within a particular set of social relations gain or lose particular properties,
powers, and abilities. Part of this is the development of a ‘history’ that is specific to that
set of relations—hence it is not possible to accurately trace ‘meanings’ back across
different time periods. Thus one cannot ever speak of ‘the working class’ outside of
capitalist industrial relations: in feudalism there was no ‘working class’—the peasants
were geographically distributed very differently, they had even less of a ‘common cause’
than the industrial working class, etc. To cast present categories back across time/social

56 Understood in the wrong way, this would appear to be a ‘scaled-up’ version of the ANT
‘network’ argument criticised in the preceding chapter—i.e. that all things gain their properties
from their relations. This is not the argument being made: what is being argued is that the
properties of things can include both inherent and circumstantial properties. Importantly, social
properties are necessarily either assigned through structural relations (e.g. patriarchy or racism)
or mediated through structural relations (e.g. differences in life expectancy based on social class).
formations is to engage in the act that now Marx, Althusser, Balibar, and Foucault have all warned against: reading the past in terms of the present.57

3.4 Analysing Althusser’s Theory
The aleatory materialism found in Althusser’s later work can be seen as developing from his earlier arguments regarding the importance the material world exerts in constituting social relations. Three works stand out as particularly important for understanding Althusser’s development of aleatory materialism: Contradiction and Overdetermination (1965/2005a, hereafter CO), Marx’s Relation to Hegel (1970/2007, hereafter MRH), and Machiavelli and Us (1976/1999, hereafter MU). Contradiction and Overdetermination is Althusser’s elaboration of Marx’s alterations to Hegel’s dialectic, not only ‘inverting’ if but also ‘demystifying’ it. Marx’s Relation to Hegel develops some key points found in Contradiction and Overdetermination, viz. the extraction of a specifically materialist understanding of history from Hegel’s teleology and Idealism. Finally, Machiavelli and Us examines Althusser’s long-standing interest in Niccolò Machiavelli as a theorist of both political practice and social relations; but, importantly, it is also where Althusser develops a further account of aleatory materialism.58

57 This is a point that will be further developed in the chapter on Foucault 4.2, where he discusses different means of ‘ordering’ objects. (The opening pages of The Order of Things, where Foucault draws the comparison to ancient Chinese typologies, serve as an immediate example of this point.)
58 A version of the text Machiavelli and Us, appears to have been first written for a course taught by Althusser in 1962. This version subsequently lost, he re-wrote the course for teaching again in 1972 and then added revisions to the text in 1975-6. “Aleatory materialism” was a term added by Althusser during this latest period (Matheron, 1999: vii-ix).
Althusser, Marx, and Hegel

A key element of Althusser’s work is his elaboration of Marx’s theoretical transformation of Hegel. Marx’s famous ‘inversion’ of Hegel’s dialectic incorporated a ‘demystification’—a move of huge theoretical complexity that remained for a long while, Althusser argues, largely unacknowledged within Marxism. The result of Marx’s “radical modification” (RC: 186) was to extract Hegel’s conception of historical change as a process from his teleological argument (Balibar, 1996: 114) that History progresses as Spirit successively overcomes its alienation from Truth. Marx’s reformulation altered this in two ways: the first, that material (rather than Idealist) relations had primacy in influencing change; and second, that in order to remove the teleological account of change, the internal structure of the dialectic itself had to be transformed.

Beginning with a critique of Hegel’s conception of history, Marx argued that history does not have any predetermined path. Hegel set out in his Logic (Hegel, 1830/1975), the argument that there was an (as yet unknown) internal Truth to any society in each particular epoch the society existed in. Society develops through the struggle of Spirit to recapture knowledge of its own essence, it own Truth. Overcoming alienation is the driving force behind all (meaningful) struggles that a society/nation faces to overcome the contradiction between its essence and its lack of self-knowledge. It is because of the uniquely human attribute of being able to apply Reason to the world, that society becomes the vehicle for this change—for instance, humans cannot ‘sit back’ and ‘wait’ for knowledge to appear; knowledge will only appear through a process of dialectical struggle.

Marx’s key move, Althusser argues, is to reject a particular theoretical component of Hegel’s dialectic that was the “negation of the negation” (MRH: 181). For Hegel, the contradiction between essence and knowledge manifests itself in his formula of the
dialectic: (i) Abstract, (ii) Negative Reason, (iii) Positive Reason (Hegel, 1830/1975: §79). For Hegel, the movement of the dialectic is in negating (i.e. ‘removing’) the negation (i.e. ‘lack’) that impedes Spirit knowing its real essence.

However, Althusser argues that Marx correctly identified that Hegel’s dialectic contained a teleology. If the movement is to negate an already existing negation, then there must be an original ‘thing’ that was the subject/recipient of the original negation. In other words, something must have been present in order for it to have been forgotten (e.g. I cannot ‘forget’ my knowledge of quantum mechanics, because I have never known about quantum mechanics). By stating that this ‘original thing’ was Spirit’s knowledge of itself, Hegel makes the move that establishes his teleology: all that is discovered through dialectical inquiry is merely a re-discovery, a re-establishment of a knowledge that was previously lost/forgotten (MRH: 181). Hegel’s understanding, therefore, rests on a circular conception of contradiction.

The concept of ‘contradiction’, for Hegel, instead of indicating an external contradiction (i.e. that the consciousness does not know an external object) is instead an internal contradiction (i.e. the consciousness does not know itself) (CO: 101). Hegel’s position is that consciousness either ‘hears’ (non-material) echoes of its (now re-discovered) past or sees flickering anticipatory allusions to its future rediscovery of its (presently forgotten) self.

These images and worlds concern [consciousness] only as echoes (memories, phantasms of its historicity) of what it has become, that is, as anticipations of or allusions to itself. Because the past is never more than the internal essence (in-itself) of the future it encloses, this presence of the past is the presence to consciousness of consciousness itself…. A circle of circles, consciousness has only one centre… (CO: 102, emphasis in original).
Hegel’s position becomes even more difficult. Returning to the “negation of the negation,” it becomes clear that Hegel is, in fact, only referring to ‘Spirit’ in its most abstract sense. This means, as Althusser argues, that there is no subject in Hegel’s dialectic.

…for the Hegelian dialectic, too, is teleological in its structures, since the key structures of the Hegelian dialectic is [sic.] the negation of the negation, which is the teleology itself, within the dialectic.

…History is not the alienation of Man, but the alienation of the Spirit, i.e. the ultimate moment of the alienation of the Idea. For Hegel the process of alienation does not ‘begin’ with (human) History, since History is itself no more than the alienation of Nature, itself the alienation of Logic. …

From the point of view of Human History the process of alienation has always already begun. That means, if these terms are taken seriously, that, in Hegel, History is thought as a process of alienation without a subject, or a dialectical process without a subject (MRH: 181-2, emphasis in original).

To paraphrase, the position that (Althusser argues) Marx has identified in Hegel is twofold. The first is that Hegel’s dialectic is in essence self-referential. By referring to the “negation of the negation” (to ‘remove a removal’, i.e. to reinstate a previous circumstance), Hegel is unable to refer to the external world as the source of knowledge. Knowledge is simply there to be rediscovered as ‘already existing’ within the inquiring consciousness.

Second, Hegel’s position lacks a continuous subject who is the ‘being’ overcoming alienation. Arguing that the alienation of knowledge from consciousness occurred before humans, Hegel’s philosophy is that it is Spirit (which is supra-human) which is alienated from knowledge of itself—and this predates the arrival of human subjects. Therefore, while particular moments of dialectical movement might have either human consciousness, a nation, or Spirit as the ‘subject’, there is no overall continuous subject within the dialectic. Through a process of logical reduction, Althusser argues that Hegel finds himself in the position of arguing that the only continuous focus (i.e. the continuous
subject) of the dialectic is actually the dialectic itself. This “extraordinary paradox” is because:

If Logic\(^{59}\) is nothing but the concept [i.e. the theoretical representation] of the Idea (of the process of alienation without a subject), it is then the concept of this strange subject we are looking for. But the fact that this subject is only the concept of the process of alienation itself, in other words, this subject is the dialectic, i.e. the very movement of the negation of the negation, reveals the extraordinary paradox of Hegel. The process of alienation without a subject (or the dialectic) is the only subject realised by Hegel. There is no subject to the process: it is the process itself which is a subject in so far as it does not have a subject (MRH: 184, emphasis in original).

To put this complex passage in other words, Hegel’s *Logic* is meant to be both a detailed examination of, and a guide through, the process required to remove alienation, resulting finally in the achievement of Absolute Knowledge. Whatever the alienated subject is of this process is then also the subject of the dialectic and of History. But upon reflection, it becomes clear that the Logic (which includes the dialectic as the prime element within it) is merely Hegel’s (formalised) theoretical representation of the ‘alienated Idea’ (Hegel, 1988: §19). This means that when the Logic (which is, of course, the system to which all the world operates) refers to the alienated Idea as a separate thing, the Logic is, in fact, only tautologically referring to itself.\(^{60}\) This is the logical loop that Hegel created for himself: the Logic and the alienated Idea are the same thing, just conceptualised differently. This means that there is no place for an external alienated subject to be inserted into the dialectic: the Logic is merely the process for resolving ‘alienated Idea’ into ‘Idea’. If the Logic is the system by which knowledge of the world can be gained and so overcome alienation, then it has to be separate from the alienated Idea. If it is not separate (which Althusser argues is Marx’s critique of Hegel) then the only ‘subject’ the

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\(^{59}\) The ‘Logic’ is the system identified by Hegel and according to which the whole world operates.\(^{60}\) An analogy might be a person describing the facial features of another person—but all the while never realising that, in fact, they are describing a reflection of themselves.
Logic refers to is not an ‘alienated subject’ (such as a human subject) but the *concept* of alienation itself. The “negation of the negation” by the dialectic, therefore, is nothing more than the dialectic affecting the Logic (and therefore itself)—because, of course, the dialectic is a component of the Logic, which is in turn itself just the representation (“the concept”) of alienated Idea.

This tautology runs so deep in Hegel’s philosophy that he is forced into making it a teleology: if Logic is meant to work by negating itself (i.e. to work erasing its own alienated essence from the Idea), then it *must already have* a preconceived End which it will ultimately find. “It is in teleology that there lies the true Hegelian subject. Take away the teleology, there remains the philosophical category that Marx inherited and then separated: the category of a *process without a subject*” (*MRH*: 184-5, emphasis in original). This removal of the ‘mystification’ inherent in Hegel’s dialectic leaves Marx with a highly detailed and complex theoretical account of the structure of social relations and how they change over time. It is this Idealist account that Marx transforms into his *materialist* account of social and historical change.

**Social change: contradictions and overdeterminations**

*Contradictions*

As has been shown, a key development in Marx’s thought is his adaptation of Hegel’s conception of history. Marx’s argument removes the teleology inherent in Hegel’s philosophy as well as inverting the ‘primary/secondary’ relationship between the Idea and the material. The inversion is, however, insufficient on its own to offer a viable alternative to Hegel’s conception of historical change. The development that Marx then makes offers a new account of the interactions between social structures. By removing the tautology that mistakenly constructs a ‘subject’ when none actually exists, Marx
shows that it is the change to the social structure that should be the primary object of analysis and inquiry.

An important element in Marx’s reworking is his adaptation of the concept of ‘contradiction’. Contradictions can be understood to be antagonistic opposing forces generated by, and centred around, particular social relations (CO: 98-99; see also Benton, 1984: 63). In Marxist terms, they can exist in both the base or the superstructure of a society. Althusser uses Lenin’s analysis of the contradictions inherent in Russia before the Bolshevik revolution as an example:

…the weakness of Tsarist Russia. This weakness was the product of this special feature: the accumulation and exacerbation of all the historical contradictions then possible in a single state. Contradictions of a regime of feudal exploitation at the dawn of the twentieth century…. Contradictions of large-scale capitalist and imperialist exploitation in the major cities and their suburbs, in the mining-regions, oil-fields, etc. Contradictions of colonial exploitation…. A gigantic contradiction between the stage of development of capitalist methods of production… and the medieval state of the countryside (CO: 95-6, emphasis in original).

However, the greatest is “contradiction reduced to the purest form (the contradiction between Capital and Labour)” (CO: 98, emphasis in original). This contradiction is formed within the “economic structure” of society (Marx, 1859/1983: 160; also see footnote 78) which, in Marxist theory, are the foundational relations upon which the wider social relations of politics, law, culture, etc. then form. The ‘purity’ of the capital-labour contradiction stems from the enduring antagonism between the systemically embedded opposing interests of capitalist employers (who own) and wage labourers (who produce).

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61 One of Marx’s clearest formulations of the base/superstructure model is in A Contribution to the Critique of Political Economy, where he describes it as:

In the social production of their life, [humans] enter into definite relations that are indispensable and independent of their will; these relations or production correspond to a definite stage of developed of their material forces of production. The sum total of these relations of production constitutes the economic structure of society—the real foundation, on which rises a legal and political superstructure and to which correspond definite forms of social consciousness (Marx, 1859/1983: 159-60).
‘commodities’. The particular relations that define a CMP— the particular linkage of property and economic power relations— enable the property owner to extract and retain surplus value through systemically under-paying the labourer for the real value of the products that they manufacture. (This is different to the property and political power relations, as was the form of the FMP (Hindess and Hirst, 1975/1977: 227; RC: 217; Marx, 1867/1990: fn.35, p.175-76).) The labourer is forced into this relationship because there are no viable alternative means of production available to them in order for them to produce either their own goods for self-sustenance or in competition with industrial manufacturers (cf. Balibar’s argument above regarding ‘machine tools’). This antagonism is the enduring ‘contradiction’ between capital and labour. Contradictions form in both the underlying economic relations that give initial structure to society as well as in the social relations that are generated from the original economic relations.

However, for Althusser, no contradiction exists concretely in a ‘pure’ and isolated state. In every concrete contradiction its elements are always mediated by its place in the social structure. It is only possible through abstract theoretical analysis to develop a concept of what the contradiction would consist of if it were able to be extracted and isolated (which it is not). Each particular contradiction, therefore, should always be understood as being part of the concrete social world, woven from and woven into the fabric of the particular social relations of which it is part. “…[T]he real contradiction was so much one with its ‘circumstances’ that was only discernable, identifiable and

62 In Marxist theory ‘commodities’ are products explicitly made for sale in the marketplace with the expectation that their perceived utility value (i.e. their ‘use’ value) will draw in buyers to purchase them. Alongside this, they are produced by isolated individuals who maintain no clear idea what other products are being produced by other producers (i.e. there is no general direction or organisation to production). Specifically, Marx defines them as “objects of utility [that] become commodities only because they are the products of the labour of private individuals who work independently of each other…” (Marx, 1867/1990: 165).
manipulable through them and in them” (CO: 98, emphasis in original). Theoretically it is possible to create an abstract concept of what the contradiction would be, but concretely the contradiction is always part of social relations—it has an immanent real existence.

Societies can have multiple contradictions manifest at the same time, disrupting the social order. However, even when such multiple contradictions materialise in a single society (such as in Tsarist Russia), it is not the case that these contradictions are representative of some ‘essential’ or ‘super’ contradiction. Even though Althusser develops Lenin’s analysis that large numbers of contradictions can “fuse” to become a “ruptural unity” (CO: 99), he never argues that they simply ‘merge’ into one ‘meta’ or ‘basic’ contradiction.

…[S]trictly speaking, it cannot be claimed that these contradictions and their fusion are merely the pure phenomena of the general contradiction. The ‘circumstances’ and ‘currents’ which achieve it are more than its phenomena pure and simple. They derive from the relations of production, which are, of course, one of the terms of the contradiction, but at the same time its conditions of existence;… This means that if the ‘differences’ that constitute each of the instances in play… ‘merge’ in a real unity, they are not ‘dissipated’ as pure phenomena in the internal unity of a simple contradiction. The unity they constitute in this ‘fusion’ into a revolutionary rupture, is constituted by their own essence and effectivity, by what they are, according to the specific modalities of their action. In constituting this unity, they reconstitute and complete their basic animating unity, but at the same time they also bring out its nature: the ‘contradiction’ is inseparable from the total structure of the social body in which it is found, inseparable from its formal conditions of existence,… (CO: 100-101, emphasis in original).

In other words, it is not that contradictions merge to form a single ‘basic’ and ‘pure’ unity; instead they form into a unity that is shaped by the wider social structure that they originally manifest in. They combine like the individual strands of a rope, retaining their individual constitution as particular contradictions but forming together into something much larger and capable (when combined) of different effects. (Althusser does not term it this way, but the ruptural unity may be thought of having emergent properties in the CR
sense.) Overall, this is why Althusser argues that there exists an *overdetermination* from the social structure over economic relations.

*Overdetermination*

Althusser argues that the process of ‘overdetermination’ (the concept is borrowed from Freudian psychoanalysis) is something theoretically specific to Marxism, a development from Marx’s reworking of Hegel’s conception of contradiction. As outlined above, Hegel’s use of contradiction was tied to his argument for the *internal* conflict within the subject; a contradiction that, when manifesting through the dialectic, led to the (re)discovery of knowledge. Marx altered this understanding to argue that it was *external* material relations that caused contradictions; this freed the concept of from its Idealistic and subjective base. Contradictions are both generated by and tied to social relations: they are generated because of the particular structure of social relations; but they are also tied to social relations, it is impossible for them to break free and to have an ‘independent’ or ‘pure’ existence. Contradictions are *overdetermined* because they are shaped by social relations. It is this generation by and continuing relationship between the contradiction and the particular (‘peculiar’, even) social relations that spawn it that leads Althusser to say that contradictions are ‘overdetermined’.

Contradictions exist solely because there are antagonistic relations *within* a particular set of social relations. But the contradiction exerts an influence and force that is *separate from* those relations, even though it is only able to manifest *through* those relations—hence the overdetermination: the contradictory force is (partially) shaped by the particular structure of the social relations particular to each society. Most structures present in one society will likely not be present (in exactly the same way) in another. For instance, the capital-labour contradiction is present in all societies which have a capitalist
structure to their economic relations. However, the contradiction will manifest differently in countries with a welfare state, those without a welfare state; those with an independent and organised labour force, those without an independent and/or organised labour force; those that increase the extraction of surplus-value and raise workers wages, those that increase surplus-value extraction and do not raise workers wages, etc. The important point here is that the same abstract tension/contradiction manifests itself through different concrete structures—and consequently presenting different powers, opportunities, and effects depending on what form it takes.

…[T]he Capital-Labour contradiction is never simple, but always specified by the historically concrete forms and circumstances in which it is exercised. It is specified by the forms of the superstructure…; specified by the internal and external historical situation which determines it on the one hand as a function of the national past…, and on the other as functions of the existing world context… (CO: 106, emphasis in original).

Overdetermination ‘is’, therefore, the effects of concrete social relations that shape inherent forces that are created by and contained within particular social relations. Overdetermination itself leads to one of two effects: one is a ‘revolutionary rupture’, where the contradictions combine into a unity that overtakes the inertia and dampening effect of the social structure, the other is ‘historical inhibition’. The Bolshevik-led demise of Tsarist Russia is an example of a revolutionary rupture. Historical inhibition, however, is where the overdetermination acts as a “block” for the contradiction (ibid.); here the social structure partially nullifies the contradictions that are present.63

The complex causality behind a rupture or an inhibition may not necessarily be the result of a powerful overdetermination: Althusser cites their opposite,

63 This ‘nullification’ aspect is picked up again in the discussion of Althusser’s conception of ‘dispositif’ [either “apparatus” or “dispositive”] below.
underdetermination. In a very brief allusion to the concept, Althusser argues that underdetermination consists of:

I am deliberately stressing underdetermination, because while certain people easily accepted a simple supplement to determination, they could not accept the idea of underdetermination—that is, of a threshold of determination which, if it is not crossed, causes revolutions to miscarry, revolutionary movements to stagnate or disappear, and imperialism to rot while developing, etc. (Althusser, 1967/1990: 223).

Underdetermination is, then, the point at which the exploitation of a contradiction (e.g. revolutionary politics) or the impetus of a conjuncture (e.g. imperialism) to produce a further (series of) conjuncture(s) falls short of what is needed to alter existing social relations. It is worth noting that Althusser is scornful of taking the over- or underdetermination as a formulaic prescription: “…it is not a question of treating [them]… in terms of the addition or subtraction of a quantum of determination, a quantum added to or subtracted from a pre-existing contradiction—that is, one leading a de jure existence somewhere” (Althusser, 1967/1990: 221). The over- or underdetermination of a contradiction is because contradictions are inherently uneven: i.e. a contradiction is not a simple 50:50 face-off. Over- and underdetermination require that we think of contradictions as containing much greater differential between the contradicted elements: not a 50:50, but more like a 90:10.

For Althusser, giving a material history to Marxism highlights the process of where objects have come from. Going back to Balibar’s examination of the move from feudal to capitalist mode of production, the factory owners were already affluent and powerful and the peasants and petty-commodity producers were already poor and weak. The CMP did not ‘magic’ the constituents of each group/class into existence; the CMP altered the relations between two existing groups/classes, transforming them (in the process) into another class relationship that was even more unequal (for the factory owner now only
had to compete against other factory owners, not other petty-commodity producers—and
the worker could compete with neither). The Capital-Labour antagonistic contradiction
may have formed as part of the CMP, but it formed out of the existing groups/classes
that were already present. And as soon as it ‘replicated’ itself for the first time (a moment
first occurring in Britain—cf. Althusser’s argument about the failed capitalist take-off in
Italy), the existing power relations were fully transformed. As Althusser states: “…two
quite unequal classes confront each other… the working class is not the opposite of the
capitalist class, it is not the capitalist class negated…. They do not share the same
history, they do not share the same world… yet they come into confrontation” (Althusser,

As Balibar (1996: 115) argues, ‘cause’ is never only one thing or uniform; it is
always a series of conjunctures and never a monolithic structure.64 Structural change
occurs through unpredictable successions of conjunctures, Balibar continues (1996:
115), but these conjunctures are also partially determined by the structures with which
they come into contact. To put this in other words, once a structure is formed it mainly
changes through the effects of different events (conjunctures); but those conjunctures
affecting a particular structure become partially or wholly determined by the structure
itself, meaning that parameters are set regarding the ‘possible’ outcomes of that
conjuncture. To give a simple example, poor management and poor workplace safety
that results in a factory fire will have a range of different outcomes if the fire is in a book
printers than at a chemical plant. The same type of conjuncture (an accident) can have

64 As has been shown earlier in Chapter 3, this would be partially rejected by critical realists who
would argue that individual mechanisms (‘causes’) can be isolated through establishing closed
systems via scientific experimentation. However, in terms of open social systems, the ‘cause’ of
an event is almost certainly only ever the product of multiple factors.
very different parameters on its effects depending on the structure within which it occurs.\textsuperscript{65}

However, it is worth making explicit here that Althusser’s use of “structural causality” was problematic. As Benton (1984: 64-65) identified, it can implies a self-generating character to social relations and that this, seemingly, loses “the fluid, the essentially transient, and the transformable character” of society is abandoned. If, as Benton argues, society is portrayed as self-generating, then it is eternal and is even \textit{less} likely to succumb to change that is \textit{not} self-generated. This criticism can be held off at this point because aleatory materialism offers a good response to it (the argument further below expands upon how aleatory materialism can be used as a wider part of Althusser’s position on social change).

Althusser develops a comment made by Engels,\textsuperscript{66} that while economic contradictions form the largest contradiction in society they do \textit{not} form the ‘only’ determinant factor (\textit{CO}: 112).

In short, the idea of a ‘pure and simple’ non-overdetermined contradiction is, as Engels said of the economist turn of phrase ‘meaningless, abstract, senseless.’ That it can serve as a polemical and pedagogical model… does not fix its destiny for all time (\textit{CO}: 113).

This relates to Althusser’s (in)famous reference to Engels’ statement that economic production was determinant “in the last instance” (\textit{CO}: 111-3). Taken within the context of overdetermination this means nothing more than, to Marxist scholars at least, that

\textsuperscript{65} It is worth noting that some conjunctures are so overwhelmingly powerful that when they interact with a structure there is only momentary (if that) ‘reflective’ effect upon the conjuncture itself. The tsunami that struck the Fukushima Dai-ichi Nuclear Plant in 2011 in Japan quickly overwhelmed the structural defences erected around the four reactors. In terms of this analysis, while the ‘sea wall’ held back the tsunami waters for the first few seconds, the magnitude of the (naturally formed) conjuncture was so great that once the defences where overwhelmed is was, for all intents and purposes, as though they had never existed.

\textsuperscript{66} Letter to J. Bloch, 21\textsuperscript{st} September 1890.
major (historical) social change has maintained a close correlation to changes in a society’s productive capacities and relations. Arguably, it is in this manner that Althusser maintains Engels’ position that the economy has in general, over time, been the largest influence in the form that a society takes. However, these productive influences are always held in check by the superstructure, as it exerts its own ‘shaping’ influence—i.e. the ‘overdetermination’—upon these productive relations. A good analogy for the effects between these relations is language: language enables different forms of expression but yet consists of a definite structure. This structure does not absolutely determine what can be said, but it does define and restrict possible actions (i.e. possible expressions).

‘Determinant in the last instance’, therefore, incorporates the idea that productive relations constitute an important part of social relations—at least to the extent of giving an initial impetus or direction to them—but not existing in such a way that they have a form independent from wider social relations. These wider social relations also ‘reflect back’ upon the economic relations. To quote Althusser:

This overdetermination is inevitable and thinkable as soon as the real existence of the forms of the superstructure and of the national and international conjuncture has been recognised—an existence largely specific and autonomous, and therefore irreducible to a pure phenomenon. ...[T]he economic dialectic is never active in the pure state; in History, these instances, the superstructures, etc.—are never seen to step respectfully aside when their work is done or, when the Time comes, as his pure phenomena, to scatter before His Majesty the Economy as he strides along the royal road of the Dialectic. From the first moment to the last, the lonely hour of the ‘last instance’ never comes (CO: 113, emphasis in original).

Althusser’s argument can be construed in two ways. The first is that complex economic relations (like those in the CMP) require a correspondingly complex superstructure within which to operate—e.g. broad and intricate legal, political, ideological, etc. relations. If this complex superstructure were ever to fall apart, the CMP would be unable to operate with the complexity that it requires and would ‘cease to be’ long before it ever operated
alone and in ‘the last instance’. The second interpretation is that the economy is so deeply interconnected with the superstructure, that to speak of one in isolation is only possible theoretically, i.e. as an abstract concept. In the concrete, however, the economy is always and forever part of social relations, so it is impossible for ‘only’ economic effects to manifest as they always reverberate through whatever form wider social relations take. The economy, therefore, is already part of social relations; so, to say that it will somehow extract itself and make superstructural relations “scatter before” it is to misconceive the fundamentally integrated relationship between the economy and the superstructure.

The economy, then, understood as being ‘part of’—not ‘external to’—social relations influences their formation but, similarly, is influenced itself by social relations. Economic relations are social relations—indeed, it is this terminology that Balibar used when discussing the ‘connections’ that consist the CMP. By incorporating economic (i.e. ‘productive’) relations into the conception of the factors that constitute a ‘social totality’ (minus its Hegelian overtones, cf. CO: 102), economic/productive forces become embedded within the concept of social relations. This means that while they can be understood as operating separately from their social manifestations, they are also understood as being part of the same relations that animate the social structure.67

67 Productive relations have this primacy because they are, in Marxism, the primary factors in the (re)production of society.

"...[T]he first premise of all human existence, and therefore of all history, the premise namely that [humans] must be in a position to live in order to be able to ‘make history.’ But life involves before everything else eating and drinking, a habitation, clothing and many other things. The first historical act is this the production of the means to satisfy these needs, the production of material life itself. And indeed this is a historical act, a fundamental condition of all history, which today, as thousands of years ago, must daily and hourly be fulfilled merely in order to sustain human life" (Marx, 1846/1983: 171). Therefore, for Marxists, the first essential requirement for a society is to reproduce itself and its constituent members. The means by which this is done, however, differ drastically in form and effect.
The overdetermination of productive relations by superstructural relations, therefore, is a key aspect in understanding how a social totality operates. The superstructure acts—as was observed above—to either promote a ‘revolutionary rupture’ or an ‘historical inhibition’ (CO: 106). But this position raises the issue of how a revolutionary rupture becomes possible. Does a social totality need to maintain a large number of contradictions (as in Tsarist Russia) and have them congregate together into a ‘unity’? But what about societies that do not contain as many contradictions as Tsarist Russia? Is it simply the case that the primary contradiction, between Capital and Labour, becomes so great that it supersedes the dampening effects of the overdetermination inherent in the superstructure? Would this not then be the ‘last instance’ of the economy?

Althusser’s argument revolves around the subtle distinction between arguing that “the ‘last instance’ never comes,” and that economic relations (obviously) still have influential effects and powers. It becomes clear that he is arguing that the contradiction in economic relations is enough to change the social structure, but as this is never separate from wider social relations, it is always overdetermined and so never exerts its contradiction unimpeded. It becomes the task of the theorist, Althusser argues, to begin working on understanding the circumstances that can lead to a rupture in the social relations and cause such large social change (n.b.: published three years later, the discussion in RC of Balibar’s account of the move from the FMP to the CMP in Britain is a prime example here).

Let us essay a translation: anything can be determinant ‘in the last instance’, which is to say that anything can dominate. That is what Marx said about politics in Athens and religion in Rome, in an implicit theory of the displacement of the dominant instance (something which Balibar and I attempted to theorise is Reading Capital). But, even in the superstructure, what is determinant is also its materiality. … This is where the concept of ‘the last instance’ is to be sought, the displacement
of materiality, which is always determinant ‘in the last instance’ in every concrete conjuncture (Althusser, 1987/2006: 263, emphasis in original).

To briefly reflect on the argument so far, Althusser now has all the important factors developed in order to offer an outline of social change. First, he has the concept of a social totality that is freed from Hegel’s Idealist mystification. Second, he has the concept of history as an identifiable process and therefore rejects explanations of sheer random chance or supra-historical subjects/agents. Third, there is the concept of tensions (contradictions) that are present in social relations rather than in subjects (although subjects may manifest the tensions, they themselves are not the cause of those tensions). These contradictions constitute one form of impetus for change (another is aleatory occurrences, but this will be developed further below). And finally, with the concept of overdetermination, there is an explanation for why these tensions do not constantly translate into continuous, large scale, social change. Social relations (usually) ‘dampen’ the contradictions in productive relations, offsetting the tensions either by diverting attention away from them (ideologically), by creating methods to partially redistribute the surplus-value created (e.g. the welfare state), or simply through the production of other contradictions that divert attention away from contradictions in productive relations. What is so far not present is an account of how these elements interact and actually produce change. This is the focus of the following discussion.

**Althusser and Machiavelli’s ‘dispositive’**

An important influence of Althusser’s theory was his long held interest in Niccolò Machiavelli (1469-1527). In Althusser’s work *Machiavelli and Us* (1976/1999, hereafter
the translator, Gregory Elliott, quotes Althusser as saying: “[Machiavelli] is, without doubt, much more so than Marx, the author who has most fascinated me” (Elliott, 1999: xii). But Elliott also quotes from Althusser a phrase from (the then untranslated and unpublished) *UCME*, where Althusser argues that Machiavelli held:

A materialist tradition almost completely unrecognised in the history of philosophy. …a materialism of the encounter, hence of the aleatory and of contingency, which is completely opposed… to the various registered materialisms, including the materialism commonly attributed to Marx, Engels, and Lenin, which, like every other materialism in the rationalist tradition, is a materialism of necessity and teleology, that is to say, a transformed and disguised form of idealism (*MU*: xii-xiii, *UCME*: 167-8, emphasis added).

In *Machiavelli and Us*, Althusser develops an extended analysis of Machiavelli and two of his works, *The Discourses on Livy* and *The Prince*. Althusser’s argument is that Machiavelli developed an account of forming and maintaining government that was unprecedented in political and philosophical work up to that point. It is important for this argument, however, to begin with a focus on a subject that Althusser develops some way into his analysis: Machiavelli’s development of what Althusser terms a ‘dispositif théorique’.

Developed further in Chapter 6 when discussing Foucault’s use of ‘dispositif’, the discussion here will be limited to analysing Althusser’s important development of the concept. Highly difficult to translate into English (Elliott, 1999: xviii) *dispositif* is usually translated as ‘apparatus’ or ‘social apparatus’, but Elliott chooses (on the advice of David Macey, translator of many of Foucault’s works) to translate it is ‘dispositive’. The reason for this becomes clearer when Elliott outlines the use Althusser has for his *dispositif*:

68 Published in French for the first time in 1995, and then in English in 1999.
The peculiarity of this term *dispositif*… is to state a series of general theses… which are literally contradictory, yet organised in such a way as to generate concepts not deducible from them, for the purpose of theorising an “*object* which is in fact a determinate objective” (*MU*: 42, emphasis in original). [This is] Machiavelli’s “endeavour to think the conditions of possibility of an impossible task, to think the unthinkable,” (*MU*: 50) (Elliott, 1999: xviii).

The idea of a *dispositif* that Althusser elaborates, therefore, is the analysis of Machiavelli’s important development of the criteria under which *an impossible event*—for instance, stable government in Italy—could occur. The ‘dispositive’ is precisely the series of contradictory statements that Machiavelli brings together to outline this possible event. It is precisely a series of statements that should, under ‘normal’ circumstances produce either nonsensical statements or null results (i.e. the product of incompatible factors). Instead, Althusser argues that Machiavelli’s great development is to outline a series of statements that, under a specific internal relationship to each other, develops a viable outcome (the ‘theoretical object’). Translated as ‘dispositive’, it becomes clear that it implies a ‘dis-positive’: instead of a series of increasingly *supporting* statements (i.e. one building upon another, as would be expected to usually occur in a theoretical argument), Machiavelli instead brings in a number of contradictory statements *but yet* structures and develops them together in such a way as to make a viable result.

Althusser’s argument is that Machiavelli’s dispositive brings three contradictory statements into a relation with each other. By doing this, Machiavelli is able to theorise a possibility that did not exist: the means to achieve stable government in Italy.

The three contradictory theses that Machiavelli brings together are: (1) the course of natural and human things is immutable; (2) everything is in continual unstable motion and subject to an unpredictable necessity; and (3) that history is cyclical (*MU*: 34-6). The first thesis on the immutability of natural and human things allows Machiavelli, Althusser argues, to compare different instances—*viz.* forms of government—across different
principalities. However, this immutability would imply that things never change, when obviously they do. Althusser argues that Machiavelli’s second thesis, that everything in the world is subject to radical change, is a clear negation—and outright contradiction—of the first thesis. However, it allows Machiavelli to adopt the position that there are moments of stability in a changing world and that these periods of stability are comparable. The third thesis, of a cyclical history, is Machiavelli’s means of negating the ‘randomness’ implicit in his second thesis: now we find that throughout the periods of radical change that alter the periods of stability, they follow a set of related forms. This allows Machiavelli develop the position that without intervention it is the fate of Italy to suffer the continual imposition of either ineffectual (i.e. short-lived) government or simply ‘evil’ forms of government (ibid.).

The importance of this argument is that it brings together three statements that are not just in opposition with each other but are outright contradictions of each other. However, as Althusser argues, the particular form—i.e. the relation—in which Machiavelli brings them together allows for the development of an argument that enables him to produce a fourth ‘thesis’ outside of these relations. This external thesis is, according to Althusser, Machiavelli’s final ‘position’: viz. that (theoretically) there exists a void (MU: 41-2). The void is not understood as a ‘negativity’, rather it represents both the neutrality and the unlimited bounds of possibility. It is this fourth thesis, this ‘position’, that Machiavelli adopts which allows him to displace the cyclical nature of government—

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69 Precisely, Machiavelli argues that government cycles through: (i-a) Monarchy, (i-b) Tyranny, (ii-a) Aristocracy, (ii-b) Oligarchy, (iii-a) Democracy, (iii-b) Anarchy, then back to (i-a) Monarchy for the cycle to begin again (MU: 36-7).
70 For a longer discussion of the position ‘the void’ takes in Althusser’s work, see Matheron (1998) ‘The Recurrence of the Void in Louis Althusser’ in Rethinking Marxism, Vol.10(3)
“a very peculiar negation, since it does not merely deny [the third thesis], but completely *displaces* it” (ibid.: 41, emphasis in original).

The dispositive has allowed Machiavelli to set three contradictory statements into a particular set of relations which allow him to structure the statements alongside each other to create a series of interrelated propositions. The result of the dispositive is that it allows the development of a position that enables the negation of the dispositive itself—i.e. the presence of the void and its multiple ‘possibles’. The major breakthrough that Althusser identifies is this arrangement, these particular relations between the different theses:

We thereby perceive Machiavelli's relation to his general theses, to what can be called his theory of history. By working on these theses, he so arranges them that, far from applying them as the general truth of every possible object to a particular concrete object, he *determines* them in negating them by one another. And he does so in order to make them produce, on their own theoretical basis, which plays the conjoint role of philosophical principle and conceptual matrix, concepts that it is strictly impossible to *deduce* from these theses. Indeed, *taken literally*, these theses are contradictory, and the only effect they can have is to preclude any discourse. But if they are considered in their *arrangement*, their dispositive and their interplay, their inconsistency becomes productive of a new theoretical space and precise conceptual effects (*MU*: 44, emphasis in original).

Machiavelli’s theoretical displacement of existing social relations through the dispositive creates a particular form of problematic. The *possibilities* that the dispositive opens up (i.e. ‘the void’) are the means by which Machiavelli is able to ‘exit’ the problematic that he has created. Althusser is here bringing to the forefront the aleatory elements of Machiavelli’s theory. However, caution must be taken with adopting Machiavelli’s approach. It is easy to forget—and Althusser sometimes appears to fall victim to this—that what is being discussed is *all in the abstract*. While it is an intellectual feat worthy of respect and consideration, Machiavelli is not able to *effect* change, just highlight a
process through which it might occur. It is to this argument for manifesting change that
the discussion will turn before drawing to a conclusion.

3.5 Developing Aleatory Materialism In and Beyond Althusser
Aleatory materialist accounts offer to social theory an important new way of
conceptualising social change. By rejecting explanations that view social change as
driven by transcendental forces (gods, Reason, or subjectivity) and instead viewing
change as the outcome of social relations that, for the most part, exist in tension with one
another, aleatory materialism offers an account of both social stability and social change.
Aleatory materialism also offers a strong rejection of ‘deterministic’ Marxism, where iron
laws of economics and history preordain a path that society ‘must’ travel down. Instead,
as Datta argues, aleatory materialism “…stresses the contingent conditions from which
social formations emerge and in doing so, offers a non-reductionist explanation of the
contingent conditions… that may transform a social formation” (Datta, 2008: 24).

By creating an ontological account of social relations that understands them as (1)
complex, (2) mutually influential, and (3) as part of a structure that places them in relation
to one another, social change can begin to be understood as alterations to the relations
between elements. The rejection of teleological and agent-centred explanations places
the focus of theoretical inquiry firmly upon social (and natural) structures and how these
manifest as social relations. It becomes possible to elaborate a position from within
Althusser’s work that develops the argument for aleatory materialism. There are four
important aspects to his work. The first is his adoption of Marx’s reformulation of Hegel,
which allows (as has been argued earlier) for the conception of a ‘decentred totality’ and
of history as a ‘process’. The second is his argument for the operation of social relations
in terms of contradictions, the effects of overdetermination, and the occurrence of
conjunctures in social relations. The third is to conceive of the elements in a conjuncture both as an inventory (of elements) and as a interactive system (MU: 18; cf. Hardy, 2011: en.9; Lawson, 1997/1998: 164-165). Finally, there is the aleatory form of the changes that occur to social relations—a relation that enables key elements in Althusser’s argument to be brought together into a relational whole.

**Events within decentred totalities**

Althusser’s argument for the development of history as a process and society as a totality of interlinked relations was outlined earlier. Althusser’s use of Marx’s transformation of Hegel gives Althusser the means to adopt the position that it is through changes to social relations over time that ‘society’ is understood to change. All change occurs within an already-existing space and place, forming it into another space/place (MRH: 181). The forms of change that interest this discussion are specifically those that alter the existing social relations—these Althusser calls historical events (CO: 126).

Amongst the huge number of ‘events’ that constantly occur in society, it is those events that later become inserted into social relations that are understood to be ‘historical’. If an occurrence/event alters the social structure, then it is conceptualised as being an historical event.

What makes such and such an event historical is not the fact that it is an event, but precisely its insertion into forms which are themselves historical, into... forms which... are perfectly definable and knowable.... An event falling within one of these [historical] forms, which has the wherewithal to fall within one of these forms, which is a possible content for one of these forms, which affects them, concerns them, reinforces or disturbs them, which provokes them or which they provoke, or even choose or select, that is a historical event (CO: 126, emphasis in original).

Althusser’s position is that what allows an historical event to be recognised is a posteriori knowledge—i.e. an event is ‘historical’ precisely because it has, ultimately, become part
of the social structure. But this does not explain how the event becomes part of the social structure.

*Understanding the constitution of conjunctures/events*

Through utilising (the second of) his arguments regarding contradiction and overdetermination, it is possible to develop his account of *conjunctures*. Arguing that a theorist needs to “think in the conjuncture,” Althusser states:

…[T]aking account of all the determinations, all the existing concrete *circumstances*, making an inventory, a detailed breakdown and comparison of them. … This inventory of elements and circumstances, however, is insufficient. To think *in terms* of the category of conjuncture is not to think *on* the conjuncture, as one would reflect on a set of concrete data. To think under the conjuncture is quite literally to submit to the problem induced and imposed by its case:… *(MU: 18, emphasis in original).*

It is *not*, therefore, a matter of developing concrete accounts that analyse the conjuncture *itself* as a ‘thing’ (e.g. that would be akin to analysing a jammed mechanism and trying to understand it *as* a jammed mechanism). Instead, the conjuncture is analysed as nothing more than a series of forces/relations that, together and in a particular form, have produced a particular circumstance (e.g. moving the analysis to investigate what the mechanism consists of and that it might do something other than ‘be’ jammed). So, Machiavelli (and by extension, Althusser) is not concerned with the conjuncture *qua* conjuncture, but is instead concerned with understanding how the conjuncture ‘came to be’ and what it might take to destabilise it. Although ‘conjuncture’ itself does not necessarily need imply a ‘negative’ quality. It is only when ‘thinking in’ the conjuncture that it becomes necessary to investigate it (a task of interest to Althusser, as a Marxist

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71 It may be helpful to continue the quote: “…the political problem of national unity and the constitution of Italy into a national state. Here the terms must be inverted: Machiavelli does not think the problem of national unity in terms of the conjuncture; it is the conjunct *itself* that negatively, yet objectively, poses the problem of Italian national unity” *(ibid., emphasis added).*
philosopher, as he was attempting to understand how it was possible for the multiple conjunctures of the CMP to have maintained themselves for so long).

It is also important to recall that conjunctures—‘crystallised encounters’ Althusser later termed them (UCME: 170)—also produce ‘truths’ that are constant for as long as the conjuncture endures. The “relations of force” (MU: 19) that produce the conjuncture also give rise to particular effects that act in the same way as ‘laws’. By maintaining the different elements (which have different strengths, powers, and effects) in a particular relationship/form, the conjuncture partially (over)determines the outcomes possible from it. The productive relations found in the CMP, for instance, overdetermine elements of the social structures that form around it. A conjuncture, therefore, can be understood as constituting a particular (re)configuration of ‘relations of forces’—which might become a ‘historical event’ if the conjuncture subsequently impacts upon existing social structures and produces a lasting effect (either as an enduring alteration or ‘damage’ that needs ‘repair’).

Alongside defining the ‘form’ of a conjuncture (i.e. the particular relation of forces of which it consists) and the problematic of analysing a conjuncture (thinking ‘within it’), Althusser also devoted considerable time to examining the circumstances leading to a conjuncture. Machiavelli is again important because, for Althusser, Machiavelli attempted to define the factors required to ‘form’ an opposing aleatory/conjunctive moment. In The Prince, Machiavelli outlines the two essential attributes that a Prince must be able to marshal: fortuna (external/objective) and virtù (internal/subjective). Fortuna corresponds closely to chance events, general good fortune, and to ‘circumstance’ (MU: 35, 74). For a Prince to stamp their mark on Italy, fortuna must be moving events. Virtù, on the other hand, is the quality possessed only by those who can utilise and, where required, partially create fortuna in order to establish themselves. ‘You
create your own luck’ partially describes this situation. *Virtù* is not ‘virtue’, nor is it an
‘intrinsic essence’ of the Prince-individual: it is, instead, “merely the reflection [in the
individual], as conscious and responsible as possible, of the objective conditions for the
accomplishment of the historical task…” (*MU*: 93-4).

Althusser identifies within Machiavelli’s texts the construction of an *individual* who
could potentially harness—possibly even *produce*—an aleatory moment in order to
create a desired outcome. This would appear to be at odds with Balibar’s argument of
the change from FMP to the CMP, which focuses much more strongly on the social
structure. However, it is not so much the *agent* of change that is here holding
Althusser’s interest, rather it is the creation of the *moment* of change—hence his focus
on understanding what can produce a conjuncture. In Machiavelli, the successful Prince
is successful precisely because s/he can escape the cyclical forces of history by
dragging Italian government into the void of possibility. In Balibar’s (*RC*) and Althusser’s
(*CO*) work it is the *periods of flux* in social relations that open up (or close down) the
possibility of change.

To reconcile these two (conflicting) accounts, Althusser focuses much more heavily
upon the ‘void’. Initially populated by individual atoms that become subject to the
*clinamen*—‘the swerve’ (*UCME*: 169)—the void slowly becomes a space where *existing*
structures act as ‘hooks’ (ibid.: 191), more readily capturing particular forms of structures
over others. Instead of Machiavelli’s Prince-individual, Althusser shifts his focus to the
(more general) encounter between *politics* and *history* which leads to *struggle* (*UCME*:
189). It is this ‘struggle’ that can create conjunctures, this conflict between forces in
contradiction that can create conjunctures.
Elements as inventory and system
So, to understand a conjuncture as a particular relation of forces and not as an independent thing-in-itself, Althusser is undertaking two simultaneous analyses. The first is that when inquiring into the conjuncture, it is necessary to develop an inventory of the particular forces in operation at the time. For Machiavelli, in both *The Prince* and the *Discourses on Livy*, he outlines the extreme misery brought to Italy by the incessant wars between the numerous mini-republics, the Pope’s interventions, and the continuous recourse to and invasion by foreign monarchs (MU: 18). This is the ‘inventory’ aspect of Althusser’s analysis: what is it that constitutes the forces active in the conjuncture.

However, merely listing the elements present within a conjuncture is insufficient for creating an account of what that conjuncture actually operates to do. For Althusser, the strength of Machiavelli’s analysis is that he moves to create an understanding of the different components as a working system. “The conjuncture is thus no mere summary of its elements, or enumeration of diverse circumstances, but their contradictory system, which poses the political problem and indicates its historical solution, ipso facto rendering it a political objective, a practical task” (MU: 19, emphasis in original). By working through the concrete relations and interactions in a particular conjuncture, the conjuncture becomes transformed into an abstract political problem—i.e. it becomes possible to theorise a means of destabilising the relations between the forces present within the crystallised conjuncture.

As seen when discussing critical realism in Chapter 2, Althusser is producing an argument very similar to the concepts of retroduction and retrodiction. Retroduction identifies the different components of an event; retrodiction then produces an account of how they are structured and how they interact (Hardy, 2011: en.9; Elder-Vass, 2007a: 472; Frauley and Pearce, 2007: 20; Lawson, 1997/1998: 164-165).
Theorising aleatory conjunctures

Finally, the argument has reached the point where a detailed description of aleatory conjunctures/events is possible. Initially, the aleatory brings different elements together, providing the background ‘mechanics’ through which conjunctures arise, creating effects (or not), and possibly crystallise in to enduring forms. The effect of this position allows Althusser to argue the following four points.

(a) That the material world is (ontologically) immanently sui generis (i.e. the world exists ‘as is’, with no outside determining structure or form outside of itself);

(b) That structures must exist in the present and continually require renewal, which means they are, therefore, open to change;

(c) That the task of the philosopher, following Marx’s lead, is to abstractly break a structure into its component parts and to analyse how they maintain their relations; and

(d) The philosopher must also try and understand the struggle(s) inherent in politics that are required to alter crystallised conjunctures.

Althusser is able to link together these four points because he relates properties, tendencies, powers, and capabilities72 found within a conjuncture to its particular configuration of elements. This enables the aleatory materialist to produce accounts of how—and why—particular structures produce different effects at different times—and even when they might be expected to ‘operate’ differently.

…[T]here exists a word in German, Geschichte, which designates not an accomplished history, but history in the present [au présent], doubtless determined in large part, yet only in part, by the already accomplished past; for a history which is present, which is living, is also open to a future that is uncertain, unforeseeable, not yet accomplished, and therefore aleatory. Living history obeys only a constant

72 As outlined in the discussion of Critical Realism, Chapter 2.
(not a law): the constant of class struggle. Marx did not use the term ‘constant’, but an expression of genius: ‘tendential law’, capable of inflecting (but not contradicting) the primary tendential law, which means that a tendency does not possess the form or figure of a linear law, but can bifurcate under the impact of an encounter with another tendency, and so on ad infinitum. At each intersection then tendency can take a path that is unforeseeable because it is aleatory (Althusser, 1987/2006: 264).

**Conclusion**

This chapter began by outlining the background to the aleatory materialist arguments made in the work of Althusser. It was contended that Althusser’s efforts—albeit incomplete—enabled a theoretical perspective to be developed that incorporated the concept of ‘non-determination’ as a key element in its argument. Non-determination was not understood to mean sheer ‘randomness’ but instead a complex system of chance circumstance that produces effects that increase the likelihood that those circumstances become repeated in the future. An example of this (quite abstract!) argument was given with an analysis of Althusser’s and Balibar’s accounts of the failure then success of capitalist economic relations to develop, respectively, in Italy and Britain. To illustrate the operation of aleatory materialism, a detailed account was given of Althusser’s argument for Marx’s reformulation of Hegel’s account of social and historical change. Marx’s removal of Hegel’s tautological construction of an historical subject that was (ultimately) meant to ‘drive’ History, meant that Marx was left with an account of social change that could be reoriented toward a materialist basis. To avoid the dangers of a materially deterministic account, Althusser argued that Marx produced an account which developed the complexity of social relations.

To produce an aleatory materialist account from this, Althusser adapted Machiavelli’s account of the ‘dispositive’, a means of (re)conceptualising social structures (or ‘conjunctures’ as Althusser termed them). By rethinking the conjunctures both as a number of different social elements but also as an operational system (i.e. where all the
elements interact with each other to produce (semi-)stable relations), the social theorist/philosopher is enabled to query the maintenance of the conjuncture and to possibly even identify sites of political struggle and contestation. Althusser’s argument itself was finally summarised into four main points that follow-on from the aleatory materialism argument. They were: (a) that the world is ontologically immanent; (b) that structures (crystallised conjunctures) require constant renewal to ensure their existence; (c) that philosophical/theoretical inquiry is an important source of knowledge; and (d) that philosophical/theoretical knowledge can be an aid to struggle.

The implications of these arguments are developed over the following chapters, including the next two which focus on Michel Foucault. Acting as a counter-weight to Althusser’s heavy emphasis upon social structure, Foucault’s account develops a similar, but by no means complementary, account to Althusser. However, as will hopefully become clear, there are similarities between the two thinkers and with the addition of a philosophical ‘underlabourer’ such as critical realism, even the possibility that the two positions can begin to engage in a fruitful dialogue. It is to the work of Foucault that this thesis now turns.
Chapter 4
Foucault and the Challenge to Theory

Introduction
Over the span of his career Michel Foucault (1926-84) produced a huge number of books, articles, lectures, and interviews. The richness of the content contained in his analyses of madness, medicine, Western thought, prisons, government, and sexuality ran parallel to his complex and highly innovative theorisation of both society and language. He achieved this with methods no more advanced than intensive archival research, the innovation came from this new style of theorisation. Foucault’s theoretical and conceptual frameworks produced two forms of inquiry that he termed ‘archaeology’ and ‘genealogy’. Both were developed in response to the ontological and epistemological questions with which he continuously wrestled.

Foucault's inquiry is usually understood to have fallen into three main periods: (1) archaeology, (2) genealogy, and (3) ‘ethics’ (or ‘technologies of the self’). There were also interim periods between each, where Foucault's large-scale research projects were reduced leaving only his (recorded) university lectures, interviews, and articles as sources for understanding changes to his thinking. As will be discussed in the following two chapters, his archaeologies and genealogies offer a very fruitful resource for theorists. The complexity of his archaeological analyses offers the opportunity for a detailed account of the structure, operation, and effect(s) of discourses. However, the erudition with which Foucault analyses the discursive is not extended in the same depth to the material world or, as Foucault terms it, the ‘extra-discursive’; this is left in a much murkier account. When moving into the genealogies, discourse becomes increasingly
subordinated to the effects of power relations. This shift ushers in a tripartite set of relations within Foucault’s work: discourse, power, and the extra-discursive. Although at different times Foucault himself has stated that his work links objectivity, politics, and ethics (1984/2003a: 23), or in another instance power, right, and truth (1976/2003a: 24), it is arguable that this is because he always conducted his investigations into specific social contexts (e.g. madness, medicine, etc.). By decontextualising Foucault’s work, the component parts fall into the categories of discourse, power, and the extra-discursive.

This thesis makes use of Foucault’s archaeological and genealogical works. This chapter outlines archaeology, genealogy, and the interim period between the two. Incorporating the most detailed work Foucault produced in regard to institutions, discourses, and the extra-discursive, it comprises a highly valuable resource for the subject matter of this thesis. Although remaining important in their own right, Foucault’s ‘ethical’ works are not covered as part of this research. Before moving on to discuss archaeology and genealogy, a brief overview of Foucault himself will be given.

4.1 Understanding Foucault and his work
Even Foucault's books, the largest and the most carefully produced elements in his oeuvre, span astonishing changes in both their form and their analysis. It would be untrue to characterise this as inconsistency; rather, it is the product of the changing nature of his inquiry. An effect of this is that few overviews of Foucault’s work as a whole have been written. Due partly to the sheer magnitude of his output and partly to the far-reaching changes introduced to his theory and method, it is difficult to produce a work that covers all of the important changes. Consequently, many of the commentaries detail either one particular aspect of Foucault’s work (either archaeology or genealogy) or
instead focus on critiquing one aspect of his work. The following discussion outlines some of the key commentaries that have been produced.

Remarkably few discussions exist that focus on Foucault’s archaeological studies. One notable exception is Gutting’s (1989) now classic work *Michel Foucault’s Archaeology of Scientific Reason*. For Gutting, archaeology is “a technique for revealing how a discipline [such as medicine or a science] has developed norms of validity and objectivity, not for questioning the very possibility of any such norms” (1989: xi). Gutting is also one of the first authors to argue that Foucault did not reject archaeology when he adopted genealogy:

It seems, then, that Foucault’s development of a genealogical approach to history is a matter of (1) returning archaeology to its role in describing both discursive and nondiscursive practices, (2) thereby exhibiting an essential tie between knowledge and power, and (3) exploiting this tie to provide a causal explanation of changes in discursive formations and epistemes. Accordingly, genealogy does not replace or even seriously revise Foucault’s archaeological method. It rather combines with it a complementary technique of causal analysis (ibid.: 271).

Furthermore, the point of the archaeologies (and then the genealogies) was not to establish that every set of relations, every institution, or every discourse was oppressive. Foucault clearly saw that some were beneficial, if kept in check: “my point is not that everything is bad, but that everything is dangerous, which is not exactly the same as bad” (Foucault, 1983/2003: 104; Gutting, 1989: 288; May, 1993: 113). By understanding the particular rules and structures that form discourses, it becomes possible to delve deeper into understanding exactly how they turn from “dangerous” to “bad.”

For many readers, however, there are problems with the archaeologies. Gutting argues that they contain both “tortuous opacities” and (seemingly) “audacious claims;” these come alongside a huge span of historical references and it raises suspicions regarding Foucault’s accuracy (Gutting, 1989: 261). “[F]or the philosophically minded
reader” there is the additional problem that Foucault appears to be a sceptic and/or a relativist (ibid.: 262). Gutting goes to some length to lay these criticisms to rest (albeit with more than a passing nod toward the validity of the “tortuous opacities” argument), but they maintain such a strong hold that many theorists have rejected the archaeologies as a whole. This is a huge loss. Part of the strength of Foucault’s work is precisely that he illuminates the processes through which knowledge is created and deemed to be ‘true’ (ibid.: 273). Of the few examples of archaeological-focused studies, Frauley’s (2007) article is a good examination of the problems facing genealogists that attempt to bypass archaeological considerations. Dupont and Pearce (2001) have a similarly well developed critique. Pearce and Tombs (1998 chapter 4) creatively utilise ‘discursive formations’ (discussed in detail below) to help explain certain hubristic assumptions made in the chemical industry. Finally, Vigo de Lima (2010) uses archaeology to examine political economy.

Foucault’s shift into genealogy has been the subject of much wider discussion. Mahon (1992) provides a detailed study which outlines and then compares Foucault’s genealogy to Nietzsche’s. Mahon examines the two conceptions of genealogy over a range of different topics and identifies in common elements in the two (viz. Enlightenment reason, the soul, and the modern subject) to illustrate the difference between Foucault and Nietzsche. A different route is taken by May (1993) in his more philosophical (and also overtly political) assessment of Foucault’s genealogy. He emphasises how Foucault’s genealogy both highlights and then engages in a disruptive “micropolitics” (ibid.: 1-12, 111, 117-8). May argues that Foucault was concerned with prioritising the micro-struggles that take place against “domination” (the general form of oppression) and not singly against “exploitation” (which is the focus only of economic oppression) (ibid.: 116). Foucault’s genealogy, May argues, moves easily into Foucault’s
“ethics” (elaborated in most detail in the last two volumes of *History of Sexuality*) where resistance to oppression takes the form of creating new spaces in which new subjectivities can be formed (ibid.: 126). Whilst never being able to find space that is completely free from relations of power, resistance can be undertaken against domination in various “micro-sites” leading (hopefully) to the establishment of more equitable social relations. Other examples of engagement with the genealogies include Prado’s (1995) philosophical engagement with Foucault’s genealogy, offering a rich and critically detailed reading of Foucault’s work. Although I agree with Scheurich and McKenzie (2005: 850, 858-9) that Dreyfus and Rabinow (1982) are too uncritical in their valorisation of genealogy as ‘superseding’ archaeology, their work remains a detailed resource. A very well informed and engaging philosophical reassessment of Foucault—charting his supposed search throughout his work for an historical *a priori*—is found in Han (2002).

Of the ‘overall’ assessments of Foucault, however, a complex but very engaging text is Gilles Deleuze’s *Foucault* (1986/2006). Here Deleuze brings in his own particular philosophical perspective, using it to explain key developments across the range of Foucault’s work. He breaks Foucault’s *oeuvre* into two very broad but nonetheless distinct periods: the sayable (the archaeologies) and the visible (the genealogies) (ibid.: 109). The sayable, Deleuze argues, constitutes *language*: to say what a thing is also means that the thing is *known*. Through his archaeological studies, Foucault determined the boundaries of language (and therefore knowledge)—and of particular importance was his concept of *statements* (ibid.: 5-12). Statements perform a particular role in discourses by condensing into a single definition what would otherwise be fractious possibilities for interpretation. Statements then act as reference points within a particular discourse. Foucault’s notion of the visible, Deleuze argues, is constituted by the
diagram—this is where “a mechanism of power [is] reduced to its ideal form; its functioning, abstracted from any obstacle, resistance, or friction... [and] detached from any specific use” (Foucault, 1975/1995: 205; Deleuze, 1986/2006: 34). Foucault’s contribution, therefore, begins with highlighting the two aspects of saying and seeing; showing that they have independent rules and systems, yet that they are intertwined.

Foucault’s analysis of this intertwining, Deleuze continues, culminates as his most important contribution. If saying and seeing are two distinct things, then what brings them together? For Foucault the answer is found in the form of the subject. The process of subjectivation (i.e. the production and emergence of the subject) mixes both saying and seeing into one space. This is achieved, Deleuze argues, through a four-part process of ‘folding’ (Deleuze, 1986/2006: 104). ‘Folding’ is a highly abstract concept and process but it can be outlined by altering Deleuze’s own analogy. One can imagine a river flowing along a channel and under the riverbed there are hollows in the earth. If a small fissure were to open in the riverbed, then a hollow would fill with water from the stream that flowed above it. Importantly, the water in the hollow would then be two things: (a) the same as the water above it (as it would maintain a connection through the fissure); but, importantly, it would also (b) be able to partially interact with itself, partially separated as it is from the larger stream. Deleuze argues that Foucault understands subjectivity in the same way: subjects are ‘folds’ (hollows) that contain aspects of the external world (the stream). Subjects manifest (limited) capacities for thought, self-reference, and self-critique, although their thoughts, references, and critiques are all informed by the wider content of the external world they are situated in. For Deleuze, this is the way that both saying and seeing become intertwined in one particular site: the subject.
The particular form of this intertwining is heavily influenced by three different factors: knowledge, power, and self (ibid.: 114). \textit{Knowledge} is the particular form within discourse(s) that saying and seeing take. \textit{Power} consists of “relations of forces” that construct the external world and also maintain these different constructions—although this world is always interpreted \textit{through} knowledge’s particular historical saying-seeing linkage. Finally, the \textit{self} is the particular set of relations internal to a fold that produce the ‘fold-as-subject’ (e.g. as an ancient Greek, as a Christian, etc.; ibid.: 119). The culmination, Deleuze argues, is that Foucault’s work makes explicit the \textit{means} of thought itself: “[t]o think is to fold, to double the outside with a coextensive inside” (ibid.: 118).

The ability to think comes from precisely this folding of relations, the ability to ‘aim’ thought at oneself. An example of this Foucault takes from the ancient Greeks: as a ruler, one must have mastery (i.e. the use of force) over a given population; but to do that effectively, one must first have mastery (force) over oneself. The Greeks were the first to \textit{fold} force back upon itself—the rulers must first rule themselves (ibid.: 99-100). This development of ‘self-mastery’ came to constitute the initial rise of what is now understood as ‘the subject’.

Overall, however, Deleuze’s insights into Foucault produce an overly harmonised version of Foucault’s thought and work. May and Mahon have a similar problem, but in their case they only ever intended to examine Foucault’s genealogy. Deleuze elaborates and expands important aspects of Foucault’s thought, but at the same time smooths over many of the jagged edges in his theory. This gives an unwarranted coherence to Foucault’s theory, as well as removing some of the more intriguing avenues for critique and change.

This chapter continues with a focus upon the first two periods of Foucault’s inquiries. The ‘archaeology’ includes \textit{History of Madness} (1961/2006), \textit{The Birth of the

It is important to note that Foucault takes for granted the reader’s knowledge of developments made to Ferdinand de Saussure’s work on structural linguistics. Foucault assumes the reader has knowledge of the difference between the signifier and signified that, together, construct a sign (1915/1986: 65-7). Saussure’s linguistic structuralism demonstratively broke the link between language understood as being somehow directly conveying the essential attributes of an object. Instead language was shown to be an arbitrary human construct. Later developments to Saussure’s work broke down the structure he had defined between words, creating the possibility of malleable signifiers and signifieds. By outlining how a word (a signifier) can substitute the concept (the signified) that it relates to, it becomes possible to show how language is not only a system in its own right (i.e. that words refer to concepts, not objects, and that these concepts are necessarily contained as part of that language) but also that language is open to change in specific social circumstances. Foucault’s work is, arguably, an ongoing engagement with exactly this issue: what, how, and who alter the structures within

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73 To save repeating the full names of publications the following abbreviations will be used from here on: History of Madness (HM), Birth of the Clinic (BC), Order of Things (OT), Archaeology of Knowledge (AK), Discourse on Language (a.k.a. ‘The Orders of Discourse’) (DL), Theatrum Philosophicum (TP), Nietzsche, Genealogy, History (NGH), Questions of Method (QM), Discipline and Punish (DP), and History of Sexuality Vol.1 (HS).
language; what are the necessary conditions for this to happen; and what are the
effects? He began this inquiry with the development of ‘archaeology’.

4.2 Archaeology
What is it?
Foucault only formally developed his archaeological method in the *Archaeology of
Knowledge* (1969/1972), which, somewhat ironically, marks the end-point of his own
explicitly archaeological research. As stated earlier in the introduction, Foucault’s
contribution to research is his development of theoretical *methodologies*, not particular
methods. So, when he spoke about his ‘archaeological method’ he was referring to the
theoretical framework he used to define both the object(s) of his research and their
significance. In an interview (unhelpfully later titled *The Order of Things*) Foucault gives
an answer to what he considers archaeology to be:

> By ‘archaeology’ I would like to designate not exactly a discipline but a *domain of
research*, which would be the following: in a society, different bodies of learning,
philosophical texts, everyday opinions, but also institutions, commercial practices
and police activities, mores—all refer to a certain implicit knowledge [*savoir*]
special to this society. This knowledge is profoundly different from the bodies of
learning [*des connaissances*] that one can find in scientific books, philosophical
theories, and religious justifications, but it is what makes possible at a given
moment the appearance of a theory, an opinion, a practice. …[I]t’s this knowledge
that I wanted to investigate, as the *conditions of possibility* of knowledge

The focus in archaeology is on explaining the various background and tacit assumptions,
the perspectives, and the orderings that allow for particular knowledges to develop.

Archaeology aims to investigate and understand this abstracted and generalised meta-
knowledge (a *savoir*) because it provides the *parameters* for specific, applied
knowledges (*connaissances*). Identifying *savoirs* is important because they brings to
light the common discursive structures and form within which other, seemingly
autonomous, discourses operate and from which they incorporate shared assumptions and principles.

However, archaeological research is not meant to uncover ‘hidden’ meanings that lie behind or beneath knowledge; nor it is meant to be a ‘philosophical hermeneutics’ that aims to decipher what has already been said (Foucault, 1983; Bove, n.d.). Foucault is adamant that archaeology can only investigate the structure of savoirs and connaissances, showing how and where the two interconnect. Discursive structure can be identified, meaning cannot. Archaeology does not, therefore, uncover the hidden meanings within old discourses—for not only is that impossible to do, it is also pointless as the speaker/writer/subject is constrained within a particular set of discursive rules anyway. It is the form and effect of these discursive structures that Foucault argues is important to discover.

Key concepts in archaeology

Statements
The smallest possible ‘object’ of inquiry using an archaeological approach is what Foucault terms a statement. For Foucault, they are the ‘elementary units of discourse’ (AK: 80) and he understands them differently to their common usage as verbal or written pronouncements. Within a discourse statements function as means of delineating and defining particular aspects or parts of the discourse itself. They cut ‘across a domain of [discursive] structures and possible unities’ and reveal the ‘concrete contents, in time and space’ of that discursive structure (AK: 87). Foucault uses the example of his (French) typewriter and the accompanying typewriting manual: his keyboard, arranged A, Z, E, R, T, is not a statement, while his manual—which lists A, Z, E, R, T, as the correct key arrangement—is a statement (AK: 86). The distinction is that statements are
manifestations of the particular ‘structures and possible unities’ that form a particular discourse: by examining statements, it is possible to determine what the discursive rules are for their formation in the first place. The typewriting manual, which contains the determination of the key layout, is the set of rules from which the typewriter is then constructed, the typewriter itself is merely a replication of the statement (ibid.).

The importance of a statement, therefore, lies in its function as particular enunciation. The “enunciative function” is a four-fold property: (1) it refers to a particular set of rules, relations, and a means of differentiation that enable particular statements to be made or not; (2) it possesses a particular relation to a subject who is able to produce a statement; (3) it operates without the need for ‘adjacent’ physical or discursive supports—i.e. statements are understood as being ‘self-evident’ within a discourse, they do not need immediate supports to ‘make them’ into statements; (4) a statement must have material existence—i.e. it must have taken place at a particular time, place, and take a material form (AK: 91-2, 95, 96, 98, 100). By identifying how statements are developed and produced—‘enunciated’—through these four mutually-constituting factors, it becomes possible to isolate a particular structure to a discourse.

Discourses
Discourse, for Foucault, does not mean mere everyday ‘speech’ (parole). Speech necessarily takes place within discourse(s)—structured, as speech is, by the various discursively defined concepts that it uses. “Discourse”, however, means something much more specific.

[A] discourse… is the always-finite and temporarily limited ensemble of those statements alone which were formulated…. The description of discourse asks…: how is it that this statement appeared, rather than some other one in its place? (Foucault, 1968/2003: 400) (see also Foucault, 1968/1991).
A discourse is *constituted* by the statements it contains. A discourse *operates* as a structure, linking together this ‘ensemble’ of statements, giving them context and particular meaning(s). The structure that a discourse contains limits relations between its elements, restricting possible interpretations of its meaning. By identifying these structures present in each and every discourse, it becomes possible to shift the focus of the archaeological research toward examining the larger premises upon which that particular discourse was made possible in the first place.

It is worth noting that discourse is *not* synonymous with ‘language’ (further distinct from ‘speech’). Language “constitutes a system for possible statements[,] it is a finite ensemble of rules which authorise an infinite number of performances” (Foucault, 1968/2003: 400, emphasis added); a discourse is a specific *use* of language, linking together a number of elements in order to generate a particular meaning. An analogy can be made to chess: the rules of chess (like language) are set and finite, but this does not mean that every chess game (like a discourse) is either pre-determined or the same each time. There are multiple possibilities for different games of chess contained within those finite rules. (To likely stretch the analogy beyond its breaking point, the possibilities of ‘speech’ might be understood as the individual moves the player considers before finally, in the act of ‘speaking’, makes her choice.)

*Discursive formations*

But in an archaeological investigation, discourses are not the overall object of inquiry. Discourses are themselves only possible within a wider set of parameters that enables them to be formed in the first place. Foucault argues that these wider parameters are
also discursive relations, and he terms them *discursive formations*. He describes them as:

Whenever one can describe between a number of statements, such a system of dispersion, whenever, between objects, type of statement, concepts, or thematic choices, one can define a regularity (an order, correlations, positions and functionings, transformations), we will say... that we are dealing with a *discursive formation*.... The conditions to which the elements of this division (objects, modes of statement, concepts, thematic choices) are subjected to we shall call the *rules of formation*. The rules of formation are conditions of existence (but also of coexistence, maintenance, modification and disappearance) in a given discursive division (*AK*: 38).

A discursive formation orders the four elements that constitute it: things (objects), things said (modes of statement), ideas (concepts) and groupings (thematic choices). *Objects* emerge through a combination of: surfaces of emergence, such as the family, workplace, prisons, etc.; authorities of delimitation, for example experts such as doctors or priests; and grids of specification, where objects are typologised and related to one another (for example hysteria, melancholia, etc.) (*AK*: 41-42). Types of statement are governed by *enunciative modalities* which: order what can be said, structure who is speaking, and position the speaking subject. Foucault gives the example of “the institutional sites from where the doctor makes his discourse” (*AK*: 50-52).

*Concepts* are structured through: forms of succession, the processes by which statements (as part of concepts) follow and are followed by other statements; forms of coexistence, how similar statements are placed together; and procedures of intervention, where some statements are judged to be continuous, while others are discontinuous (*AK*: 56-59). Thematic choices, meanwhile, are structured by *strategies* which relate to fissures—sometimes intentional, sometimes not—that are generated within a discursive formation by the manoeuvring of different factions. Themes/strategies are constrained by: points of diffraction of discourse, aspects of contention or similarity; the economy of
the discursive constellation, the particular ‘rules and customs’ of a particular sub-set of knowledge; and “the function... [the discourse] must carry out in the field of non-discursive practices” e.g. psychiatry enacted upon ‘the mad’ (AK: 65-68).

Discursive formations are different not only because they have different elements, but also because they have particular rules of formation. These rules dictate what can and cannot be said, whom or what has the ability to speak, what is determined/identified to exist or not exist, and what can or cannot change within the discursive formation’s boundaries. For instance, the rules of formation for science as a discursive formation do not allow for the ‘soul’ as an object; religious discursive formations, however, do. In short, a discursive framework structures what is and what is not ‘allowed’ to take place within it.

In addition to this, Foucault is keen to convey that discursive formations should not be seen as being static entities: discursive formations change over time. Two forms of change that happen to discursive formations are: one, the central savoir alters the connaissances that become associated with it; second, connaissances partially ‘feed into’ their associated savoir, therefore changing it too. An example of both types of change is the move of medicine from a religious to a scientific savoir: ‘medicine’ saw a corresponding change in its background concepts and objects, as well as developing new methods and sites.

Connaissance, Savoir, and Épistémè
Pinning down Foucault’s understanding of connaissance and savoir is notoriously difficult. A translator’s note inserted into AK quotes Foucault as defining the two as:

By connaissance I mean the relation of the subject to the object and the formal rules that govern it. Savoir refers to the conditions that are necessary in a
particular period for this or that type of object to be given to the *connaissance* and for this or that enunciation to be formulated (AK: 15 fn.2).

*Connaissances*, therefore, appear as the specific knowledges that regulate (‘that govern’) the placement and interaction (‘the relation’) between a knowing subject (e.g. a doctor) and an object (e.g. a patient). *Savoirs* operate a level once-removed from *connaissances*: *savoirs* give a more general and abstract—but still highly ordered—knowledge that predefines the range of subjects and objects possible for a *connaissance* to investigate. To give an example, Foucault argues that in the Classical period the *savoir* of madness contained a very small medical *connaissance*; instead, the *savoir* of madness consisted of a number of much larger *connaissances*: jurisprudence, casuistics (the study of the causes of disease), and police regulations. It was not until the nineteenth century that the *connaissance* of the medical knowledge of madness (i.e. psychiatry) began to take a dominant role and successfully excluded many of the other *connaissances* (AK: 184-185).

A problem here, however, is that it appears Foucault is making a tautological argument: *savoirs* define the overall parameters of *connaissances*, but *connaissances* feed into *savoirs* by giving them content—but which comes first? The response to this may appear to sidestep the question, but it is central to the problem Foucault began to address in his later work and which, arguably, generated ‘genealogy’ as a methodology. The difference between *savoirs* and *connaissances* has the appearance of being a hierarchy—with *savoirs* dictating the operation of *connaissances*—but upon closer analysis the two are seen to *mutually constitute* each another. An established *savoir* ‘is’ the principles that define a field of knowledge and a *connaissance* is the engagement by a particular subject (enabled through a particular set of institutions) in examining a particular object. Here, Faubion’s (1998: xxiv-xxxi) clarification on the difference
between *savoir* and *connaissance* in the French language is helpful. *Savoir* means ‘to know’ or ‘knowledge’, or even ‘awareness’ or ‘cognisance’. *Connaissance*, depending on the context, can mean simple ‘acquaintance’, or ‘learning’ and ‘mastery’, or possibly even ‘expertise’. The emphasis in *connaissance* is on the sense of *familiarity* that is present between the (knowing) subject and the (known) object; an emphasis that is not contained within the definition of *savoir*, which implies a ‘certainty’ to knowledge.

The development of a *savoir* and its associated *connaissances*, therefore, can be understood as an *immanent* process—i.e. both the *savoir* and the *connaissance* constantly affect each other. The *savoir* is a set of continually reassessed principles, the *connaissance* is a particular form of ‘knowledge-as-practice’ that ‘applies’ the *savoir* to things, generating new knowledge as a result. To go back to Foucault’s earlier *savoir/connaissance* examples, jurisprudence was madness-as-known-legally, casuistics (the now defunct quasi-medical knowledge) was madness-as-known-by-origin. What happened was that through a series of discursive and extra-discursive events, the *connaissance* of madness-as-known-medically *later* became both the dominant *connaissance* within the *savoir* of madness—but also began to feed more and more into the content of the *savoir* of madness too.74

However, this answer has so far only half sidestepped the potential tautology. Both the *savoir* of madness and the *connaissance* of medicine were already established and Foucault is merely describing the adoption—and subsequent adaptation—of medicine into madness. So where did they originally come from? Without wishing to engage in the age-old search for ‘origins’—that Foucault himself so despised and for which, arguably, there can be no real answer—Foucault did state that discursive

74 An example of this change can be found in Foucault’s edited book *I, Pierre Rivière…* (1973/1975).
formations must go through a series of transitions if they are to attain the status of a widely accepted knowledge. In AK (186-189), Foucault describes four distinct ‘thresholds’ that a discourse can move through: _positivity_ (changing from a discourse to a discursive formation), _epistemologisation_ (the discursive formation defines objects and becomes a reference point amongst competing knowledge claims), _scientificity_ (the development of internal formal rules for producing knowledge propositions), and _formalisation_ (the discursive formation becomes an axiom, a self-evident truth) (see also Pearce and Dupont, 2001). A discursive formation can go through a series of changes (of which only a few ever do) that alter both it and the effects that it produces. It is through this process that new knowledge-practices can form into _connaissances_ and then, maybe, finally become formalised into _savoirs_ of self-evident truths.

It might be beneficial to very briefly outline Foucault’s more general understanding of ‘knowledge’. Foucault is not so much concerned with finding the true metaphysics of the world—ontologically what is ‘really out there’—as he is to examine the structures and relations which _enable_ different knowledge claims to be made in the first place. On this understanding, as Allen (2010: 144-5) argues, Foucault views knowledge to be nothing more than the rules and the system(s) that create it. He does not make the distinction between ‘accurate’ or ‘inaccurate’ knowledge—the only criteria for judging what counts as ‘knowledge’ is whether or not it was produced from within the discursive structures of that time. (This does not mean Foucault believes that these structures create ontologically true and ontologically accurate knowledge, only that this is how knowledge comes to be _judged_ as true and accurate.) As Datta (2007) argues, this position does _not_ relegate Foucault’s understanding of knowledge to a complete relativism, for within

75 On this point, see the discussion of Gutting (1989) above.
each society there are criteria upon which knowledge can be judged. But it does create a Kantian paradox: Foucault is only ever able to ‘know’ knowledge and not, for instance, the extra-discursive world, for he can never escape the discursive construction of knowledge (on this subject see: Elder-Vass, 2011; Hardy, 2011). This topic will be taken up again in the following chapter.

An épistémè, for Foucault, appears to denote the particular discursive forms that have or promote a rational or (proto-)scientific emphasis. His most detailed discussion is in *The Order of Things* (1966/1994), where he investigates the ‘human sciences’.

I am not concerned, therefore, to describe the progress of knowledge towards an objectivity in which today’s science can finally be recognised; what I am attempting to bring to light is the epistemological field, the *episteme* [sic.] in which knowledge, envisaged apart from all criteria having reference to its rational value or to its objective forms, grounds its positivity and thereby manifests a history which is not that of its growing perfection, but rather that of its conditions of possibility (*OT*: xxii).

However, in *AK* Foucault argues that an épistémè is ‘not a form of *connaissance* or type of rationality’ but is instead the ‘totality of relations that can be discovered, for a given period, between the sciences when one analyses them at the level of discursive regularities’ (*AK*: 191). In a very dense paragraph, Foucault argues that an épistémè is the set of relations between ‘sciences, epistemological figures, positivities, and discursive practices’ and that the épistémè ‘makes it possible to grasp the set of constraints and limitations which, at a given moment are imposed upon discourse’ (*AK*: 192). While the épistémè can certainly change—*OT* (xxii) investigates the change in the épistémè from the Classical age to the current Modern age—it appears that Foucault uses it specifically to signify various forms of ‘epistemological inquiry,’ which arguably most readily equate to the ‘rational’ discourses most evident since the 1600s.76

76 My formulation here would appear to be somewhat *contra* to Han’s (2002: 60-64).
Examples of archaeological studies
It is easiest to give examples of archaeological studies using Foucault’s own work. As stated earlier he only set out in detail what archaeological research consisted of in AK; however, he used the term as far back as HM:

The language of psychiatry, which is a monologue by reason about madness, could only have come into existence in… a silence [on the part of madness]. My intention was not to write the history of that language, but rather to draw up an archaeology of that silence (1961/2006: xxviii, emphasis in original).

The attempt to produce an ‘archaeology of that silence’ prompted an ill-tempered exchange between Jacques Derrida and Foucault (see Derrida, 1963/2004; Foucault, 1972/2006b; Foucault, 1972/2006a), which focused on whether it was possible to speak on behalf of the mad. Even if that was Foucault’s intention when originally writing HM, the work certainly stands separate from it. Covering the development of different discursive constructs of ‘madness’ from the early 1400s to the late 1800s, HM shows how important the interconnectedness is between the discursive and the extra-discursive (the material world) in Foucault’s thought.

The Birth of the Clinic (1963/1994)—Foucault’s inquiry into ‘the development of modern medicine from the previous “medicine of types”’ (Han, 2002: 46)—has a strong focus upon the two-fold ‘spatialisation’ and ‘verbalisation’ of medical practice (BC: xi). Medical discourse is understood by Foucault to heavily involve both the physical environment and the archaeological/discursive environment. Doctors initially introduced ‘clinics’ to act as sites for specimen collection: ‘[i]n the clinic… one is dealing with diseases that happen to be afflicting this or that patient: what is present is the disease itself, in the body that is appropriate to it, which is not that of the patient, but that of [the
diseases’] truth’ (*BC*: 59). Foucault’s archaeological account of medical discourse catalogues the series of complex interactions that occurred between medicine and a material world that was now (re-)presented to it through the form of the clinic.

The clinic is not, therefore, that mythical landscape in which diseases appear of their own accord, completely revealed; [the clinic] makes possible the integration, in experience, of the [already established] hospital modification of constant form. …By means of the endless play of modifications and repetitions, the hospital clinic makes possible… the setting aside of the extrinsic (*BC*: 110).

What was previously problematic to medical discourse—and what it latently found beneficial after the formation of the clinic—was precisely that the material world did not conform to existing discursive typologies. Foucault demonstrates, though his archaeological account, that the space of the ‘clinic’ suddenly enabled new ‘reorganizations’ of the ‘knowing subject’. Indeed, it is a result of this process that Foucault relates the shift of the medical discourse surrounding ‘disease’ from the religious/supernatural to one of nature/death (*BC*: 196).

*The Order of Things* (1966/1994) is arguably Foucault’s most detailed archaeological research. In it, he outlines the processes involved in the production of ‘Man’ as an object of inquiry. It begins with a famous example, from Borges, taken from a Chinese encyclopaedia that has a particular taxonomy for classifying animals.

…[A]nimals are divided into: (a) belonging to the Emperor, (b) embalmed, (c) tame, (d) sucking pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) frenzied, (j) innumerable, (k) drawn with a very fine camel hair brush, (l) *et cetera*, (m) having just broken the water pitcher, (n) that from a long way off look like flies (*OT*: xv).

This (apparently ridiculous) structure of classifying animals led Foucault to pose a question: what makes *other* systems of classification any different? What makes these other criteria for identifying and classifying objects any different in terms of their ‘truth’, accuracy, or universalisability? To generate an answer, Foucault conducts an
archaeological study into three areas within Western thought: political economy (which later turned into economics), natural history (which later turned into biology), and general grammar. He picks these three for two reasons: first, their difference to one another, yet all experience the same change; and second, because studying more than this would have been too big a project.

He identifies a fifty-year period—1775-1825—when Western thought underwent a fundamental change to its épistémè. Human inquiry moved away from using the Classical taxonomical forms of knowledge and instead moved toward new discourses, epistemologies, and concepts formed using a basis in empirical analysis—this would later form into the Modern era (OT: 220). Foucault argues that during the beginning of the era, i.e. 1775-1795, there was a reordering of the various ‘positivities’ (i.e. the key concepts) in the three domains. These positivities kept their role in both designation (classification) and articulation (use), but their relations to other concepts in their areas were fundamentally altered—all because of the move toward empirical methods of inquiry (OT: 250). Moving the borders of knowledge away from the Classical formulae of tables and taxinomia, there was a shift towards ‘an obscure verticality’ which promoted:

…European culture… inventing for itself a depth in which what matters is no longer identities, distinctive characters, permanent tables with all their possible paths and routes, but great hidden forces developed on the basis of their primitive and inaccessible nucleus, origin, causality and history (OT: 251).

In the Classical age knowledge was pre-formulated and objects were examined to see ‘where’ they would fit into knowledge’s pre-existing categories. From the changes which resulted from the rise of the ‘inquiring Modern subject’, the ‘source’ of knowledge began

77 Interestingly, this is a very close correspondence to the first major industrialisation that swept Europe during the period from 1780-1820.
to be understood as existing in the object itself and, thus, was only obtainable through inquiry into that object.

What is important to note in Foucault’s analysis is the emphasis he places upon what he calls the ‘dense archaeological layers’ of knowledge (OT: 253, and e.g. xiii, 232, 274). Developed before Foucault offered a systematized understanding of his archaeological methodology (later outlined in AK), OT focuses attention on the events that happened within the bounds of discourse. The rise of “Man” (i.e. humans coming to be seen as entities separate from the wider cosmic order) results from changes to the means of ‘placing’ humans in a particular discursive position (from ‘taxonomical’ to ‘empirical’). Foucault shows how discourses can partially construct their ‘objects’ of inquiry. Humans were, of course, present in discourse before the appearance of Man as a concept, but it is through this new discursive construction of Man that humans came to be understood as being objects independent from any particular set place in a wider ordering. Man becomes a meta-category that (i) reifies humans as inquiring agents discovering knowledge but, importantly, also (ii) as possible objects of discoverable knowledge in themselves—i.e. they too have knowable attributes that are not pre-given truths.

In this context the Modern épistémè can be understood as consisting of a number of discursive positions that place humans as things within nature yet separate from it. For Foucault, this discursive construction of Man has led to the particular forms of inquiry that have characterised our recent past. But equally, it also means that:

As the archaeology of our thought clearly shows, man is an invention of recent date. And one perhaps nearing its end. If those arrangements [of knowledge] were to disappear as they appeared, if some event... were to cause them to crumble, as the ground of Classical thought did, at the end of the eighteenth century, then one can certainly wager that man would be erased, like a face drawn in the sand at the edge of the sea (OT: 387).
4.3 Between Archaeology and Genealogy

The Discourse on Language

Han (2002) states that Foucault’s turn to genealogy began with his inaugural lecture at the Collège de France, later called The Discourse on Language (1970/1972, hereafter DL). His focus upon truth, she argues (Han 2002: 79-84), is the first indication of a change in his emphasis from analysing the archaeological structure of discourse to outlining more explicitly the emergence of discourses in general. By investigating how certain discursive formations go on to construct ‘truths’—beyond their general set of internal relations and rules of formation—Foucault introduces a focus that was largely absent from his previous work.

Foucault argues that his focus, post-archaeology, is to examine:

…[How] in every society the production of discourse is at once controlled, selected, organised, and redistributed according to a certain number of procedures, whose role is to avert its powers and its dangers, to cope with chance events, to evade its ponderous, awesome materiality (DL: 216).

Foucault lays out three sets of rules that he understands discourses to be subject to: rules of exclusion (DL: 216), rules of limitation (DL: 220), and rules of employment (DL: 224). Exclusionary functions consist of prohibited words, the separation of madness, and the ‘will to truth’; limitation functions, meanwhile, are commentaries, ‘the author’, and discursive disciplines. Rules of employment, however, consist of rituals, ‘fellowships of discourse’, doctrine, and social appropriation.

Foucault then offers his assessment of the four “methodological demands” that will be facing him over his coming research career: the principles of reversal, discontinuity, specifics, and exteriority (DL: 229). The first—reversal—is linked, he argues, to his

78 See also Foucault’s essay What is an Author (1969/2003).
“critical” work that he has accomplished so far (DL: 231). Indeed in Modernity the will to truth is, he argues, slowly taking precedence over the other two forms of exclusion (prohibited words and the separation of madness) (DL: 219). The next three—discontinuity, specifics, and exteriority—are linked to a new methodological requirement: ‘genealogy’ (DL: 232). The difference between the “critical and the genealogical enterprise is not one of object or field, but point of attack, perspective and delimitation” (DL: 233).

It is thus that critical and genealogical descriptions are to alternate, support, and complete each other. The critical side of the analysis deals with the systems enveloping discourse; attempting to mark out and distinguish the principles of ordering, exclusion, and rarity in discourse. … The genealogical side of discourse, … deals with series [sic.] of effective formation of discourse: it attempts to grasp it in its power of affirmation, … the power of constituting domains of objects, in relation to what one can affirm or deny true or false propositions (DL: 234).

It is here that Han (2002) was seemingly too quick to dismiss Foucault’s continued use for archaeology. If one substitutes the term ‘archaeology’ for ‘critical’—and indeed Foucault himself makes allusion to this when stating that he has already investigated the disjunction between madness and reason (DL: 232)—then it appears that genealogy does not eclipse archaeology as a method but is, instead, merely the other side of the methodological coin.

Theatrum Philosophicum

Theatrum Philosophicum (1970/1998), published a year later, is an intriguing and highly abstract review-essay of two of Gilles Deleuze’s recently published books.79 In the books, Deleuze continues his study of Henri Bergson and Martin Heidegger via Friedrich

Niezsche. But Foucault’s review is done in such a way that Foucault offers his own interpretation of these arguments—and, importantly, a key focus of the analysis is Foucault’s elaboration of what he terms ‘events’, an important component of his later genealogy.

Foucault understands Deleuze as arguing that philosophy has unsuccessfully tried to escape the grip of Platonistic thought (the argument that there is an original and pure Form of everything that exists, but everything that does exist is merely an imperfect representation, doxa, of this Form) by attempting to reverse the situation (that appearance is a valid means to understanding an object). Instead, Deleuze attempts a third position: by bringing in the concept of ‘event’. Events, Foucault argues, allow Deleuze to move outside of both object and essence (TP: 345). In a particularly florid summary, Foucault states:

thus it is useless to attempt the reversal of Platonism by reinstating the rights of appearances,… Neither should we attempt to rediscover the supreme and solemn gesture that established, in a single stroke, the inaccessible Idea. Rather, we should welcome the cunning assembly that simulates and clamours at the door. And what will enter, submerging appearance and breaking its engagement with essence, will be the event;… (TP: 345).

Foucault argues that Deleuze’s concept of phantasms, things that appear because of their proximity to other surfaces (although not, seemingly, the ‘surfaces of emergence’ which Foucault outlined in AK: 41), is a key insight. These phantasms are not known through the ‘intermediary of the perception of the image’ (i.e. seeing is never knowing a thing), but are instead an oscillation between a largely unidentifiable range of possibles; a situation that Foucault terms a metaphysics of ‘incorporeal materiality’ (TP: 346). Events are externalities that involve a thing but are not (in essence) part of that thing. Examining events, Foucault argues, must necessarily involve three things: a new
metaphysics (in relation to physical bodies), a new logic (in relation to things and words), and a new grammar (in relation to discourse) (TP: 349, 350).

Metaphysics must be altered in order to incorporate the physics of (corporeal) causes but then also to include (incorporeal) effects—which are the ‘events’ in question (TP: 349). Logic must also be altered: using the example of the phrase “Marc Anthony is dead,” Foucault argues that we need to move from a ‘ternary logic, based upon the referent,’ and instead look at four interlinked terms: designations (states of things), expressions (of opinion or belief), significations (affirmations), and meanings (“dying”) (TP: 349). For Marc Anthony, dying is a very real event happening to him, for us it is a statement about him—and Foucault argues this promotes a double intangibility (for us): one towards the ‘thing’ (Anthony) and the other towards the ‘proposition’ (to die). This intangibility is based upon meaning, with Foucault arguing that meaning must be decoupled from ‘knowable objects’ (for knowledge of objects has been proven to be fallible) and instead meaning must be allowed to incorporate the possibilities contained in a statement. This creates the meaning-event—i.e. meaning which speaks of a thing and as a happening, not as attributes or as states (TP: 350).

Finally, grammar must be altered in order to comprehend the new meaning-events. Removing grammars attachment to attributes (for attributes, as Deleuze argued, can only be known through fallible perception) means instead attaching it to verbs—so we move from ‘to be dead, to be alive, to be red,’ and instead move to ‘to die, to live, to redden’ (TP: 350). To conceive of the verb in this sense opens up two poles: the present and the infinite. Thus a meaning-event is smaller than the individuality of its particular ‘moment’, but is also a referent to a repeating infinitive: the actual instant of Marc Anthony’s ‘death’ is unquantifiable; but his death is also (obviously) not the only one to ever to have occurred. As Foucault concludes: corporeal bodies are the surfaces of incorporeal
events; this incorporeal event is the meaning behind a proposition; and within discourse, this ‘present’ is an instance of the ‘infinite’ (*TP*: 350).

It may appear that Foucault’s argument is little more than esoteric semantic pedantry, but in his conclusion he relates these bodies, words, and present/instant distinctions to a wider philosophical framework. Neo-positivism, he argues, cannot understand events because of its focus upon *things*, which precludes an ability to focus on *possibles*; phenomenology constructs meaning *separately* from the event, with individuals imbuing events with meanings; and in the philosophy of history, events are transformed into moments of a *teleological* unfolding. By contrast the power of Deleuze’s work, Foucault argues, is that:

[It is] directed to lifting this triple subjection that, to this day, is imposed upon the event: a metaphysics of the incorporeal event (which is consequently irreducible to a physics of the world), a logic of neutral meaning (rather than a phenomenology of signification based on the subject), and a thought of the present infinitive (and not the raising up of the conceptual future in a past essence) (ibid. 352).

Foucault’s argument (and this is different to Deleuze’s) now seems to be that an event happens externally to discourse, but it is only through discourse that events are recognized. Furthermore, events are incorporeal because they are only ever that moment when one potentiality (from among many ‘possibles’) ends up occurring. But when they do occur they cease to be incorporeal and therefore move beyond the category of ‘event’—i.e. whilst Marc Anthony may indeed die (and that was an event *for him*), the wider ‘event’ is the series of multiple outcomes produced by his dying (but these are unknowable until they actually manifest). Indeed, out of all the these possibles—Deleuze’s ‘phantasms’—the event is merely the one that ultimately forms as a (future) manifestation.
The implications of this argument for Foucault’s archaeological work are important. The focus found in OT—where an event took place within the épistémè of Modernity and which was therefore a discursive event—is now beginning to be split between both the discursive and the material. Foucault is broadening his ontological position to now include non-discursive factors in the methodological and theoretical focus of his work. It is this broadening which, arguably, led to his adaptation of Nietzsche’s ‘genealogical’ method.

4.4 Genealogy
What is it?
Foucault opens his discussion of genealogy (Foucault, 1971/2003, hereafter NGH) with the following:

Genealogy is grey, meticulous, and patiently documentary. It operates on a field of entangled and confused parchments, on documents that have been scratched over and recopied many times.

...[I]t must record the singularity of events outside of any monotonous finality; it must seek them [events] in the most unpromising places, in what we tend to feel is without history—in sentiments, love, conscience, instincts; it must be sensitive to their [events] recurrence, not in order to trace the gradual curve of their evolution but to isolate the different scenes where they engaged in different roles. Finally, genealogy must define even those instances where they [events] are absent, the moment they remained unrealised... (NGH: 351).

Genealogy explicitly rejects the notion that history develops along some kind of pre-formed ‘path’. For the genealogist, each event is a particular (and peculiar) instance that takes place within, and is framed by, the social relations that are present at that time. (That may sound axiomatic—don’t all social instances necessary take place within social relations? And, of course, they do...) But Foucault’s genealogy asks the user—and the reader of a genealogical study—to accept that there is no essence to events. To investigate a topic genealogically is to reject viewing events as somehow being meant to
happen; instead genealogy examines the circumstances surrounding what did happen. The emphasis is upon examining and explaining how social relations shaped, even produced, the event in the first place. ‘[Genealogy] opposes itself to the search for “origins”’ (NGH: 352).

Genealogy also marks another shift in Foucault’s thinking. As Rajchman (1985: 115-117) highlights, Foucault’s genealogical approach begins to examine knowledge in terms of power. It is important to stress that analyses of power were not absent from Foucault’s archaeological investigations, but through genealogy power is examined as a key factor in both the installation of different knowledges as well as in forming social relations and events. This might be at a price, however, for as Dupont and Pearce (2001: 134) argue, some of the precision characterising the archaeological analysis becomes lost in the genealogies and the focus on power.

The focus on power also clearly shows Foucault’s continuing links to Nietzsche’s conception of genealogy and his arguments regarding domination. For Foucault, genealogy brings to light the:

…[E]ndlessly repeated play of dominations. …Humanity does not gradually progress from combat to combat until it arrives at universal reciprocity, where the rule of law finally replaces warfare; humanity installs each of its violences in a system of rules and thus proceeds from domination to domination (NGH: 358).

Each event that takes place within social relations is understood to have been partly produced by the power relations that constitute those social relations. This is not to say that each event is willed, desired, or knowingly manufactured by self-conscious social agents. Instead, Foucault’s emphasis is to show that the particular form of an event can be explained by examining the social circumstances surrounding it. Genealogy is the analysis of how various elements within social relations produce a particular event that would otherwise have manifested in a different form—or may not have manifested at all.
Key concepts in genealogy

Eventalisation

In the interview Questions of Method (1978/2003a, a.k.a. The Impossible Prison), Foucault partly outlines the focus of his genealogical method. He argues that genealogy involves the investigation of two complementary factors that, together, are the study of ‘what one might call “eventalisation’” (QM: 249). The first investigates ‘singularities’ which are responsible for ‘breach[es] of self-evidence;’ the second is ‘rediscovering the connections, encounters, supports, blockages, plays of forces, strategies, and so on’ that establish what later becomes considered as ‘self-evident’ (QM: 249).

Eventalisation analyses three distinct factors, which Foucault calls the ‘polymorphism’ of an event: elements, relations, and domains (QM: 249-50). He uses penal incarceration as an example. The elements include ‘pedagogical practices, the formation of professional armies, British empirical philosophy, techniques of use of firearms [in the army], [and] new methods of the division of labour.’ The changes to relations involve moving technical models (e.g. of surveillance architectures) from one area to another, calculated tactical responses to specific circumstances (e.g. banditry, public disorder after executions), and the application of different theoretical schemas (e.g. the utilitarian conception of behaviour) to new or different areas. Finally, the domains of reference change which means that the elements and relations find new objects upon which to turn their focus (e.g. from small technical matters to large scale interventions into the newly emerging capitalist economy) (ibid.).

Understanding penal incarceration as an event, therefore, is to examine how pre-existing forms of internment had ‘penalising’ aspects introduced to them. Similarly, how did ‘carceralisation’ become one of the accepted forms of punishment and correction?
To see these as ‘self-evident’ is to exist in a world where the event of penal incarceration—with its reformulating and reconstituting effects—has already taken place. Genealogical inquiry, through eventalisation, asks ‘how’, ‘when’, and ‘why’ these changes occurred. By inquiring in sufficient depth, Foucault argues, the genealogist can ‘construct the external relations of intelligibility’ (ibid.: 250). By developing an outline of the various elements, their relations, and the domains that they effect, the genealogist can show how an event became established as new instance of a ‘self-evident’ truth.

Methodologically, therefore, by arguing that events should be examined using this process of ‘eventalisation’, Foucault is in effect arguing that events are only possible to know post hoc. Predicting the constitution of events is impossible—there is no way that it could have been known that the disciplinary techniques developed in the army and the school (DP: 136) could have had such impact upon the penal system. One of the most important elements of Foucault’s argument is that—albeit necessarily always through historical analysis—it becomes possible to begin to formulate how various elements of the seemingly “self-evident” present came to exist together in conjunction at all. (n.b.: the similarities between Foucault’s and CR’s understanding of events should be obvious.)

Power and Domination
Foucault developed his concept of power over the course of many years, but he was consistent in understanding power as “relations of force” (Foucault, 1976/1990: 93; 1976/2003a: 15). Of course this abstracted notion of power materialised into precise and particular forms, specific to both their particular milieu/surfaces of emergence (e.g. family, school, workplace, etc.) and are related to the time period in which they are
produced (e.g. sovereign, disciplinary, bio-political and governmental). The overall effect of power is to “act upon [subjects’] actions: an action upon an action, on possible or actual, future or present actions” (Foucault, 1982/2003: 137)—i.e. the present or possible future actions of a subject are, to varying extents, both created and curtailed.

Power also operates to ‘shepherd’ subjects into new social contexts, promoting or denying possible courses of action.

Subjects exist in a social and physical world that contains various forms and operations of power relations. Power can, of course, operate negatively (to deny, to repress); but Foucault argues that it has a much more important positive function, that of creating.

If power were never anything but repressive, if it never did anything but say no, do you really think one would be brought to obey it? What makes power hold good, what makes it accepted, is simply the fact that it doesn’t only weigh on us as a force that says no; it also traverses and produces things, it induces pleasure, forms of knowledge, produces discourse. *It needs to be considered as a productive network that runs through the whole social body, much more than as a negative instance whose function is repression* (Foucault, 1976/2003b: 307, emphasis added).

These productive capacities can be both diffuse (e.g. the various ‘forms’ that the family can consist of) or concentrated. Foucault identifies particular sites of concentration that operate as “blocks” where power relations “constitute regulated and concerted systems” (Foucault, 1982/2003: 136). Prisons are examples of such ‘blocks’—Foucault terming them “an instrument and vector of power” (*DP*: 30)—and it is in places such as these that subjects are subjected to multiple (and potentially contradictory) power relations, all attempting to produce their own particular outcomes. The resultant subject is (re)shaped

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80 Foucault should not be mistaken as arguing that there were different ‘power-epochs’ that enforce corresponding changes in local-milieu power relations. Power relations always have their own particular forms, for power is in “local systems” because it “circulates” (Foucault, 1976/2003b T&P: 29, 34; HS: 99-100).
and (re)formed out of this “political field”, through these “political technolog[ies] of the body” (DP: 25-26). (For an good alternative account of how these positive effects of power might be co-opted by subjects, see (Day, 2001).)

Nietzsche’s influence upon Foucault’s conception of domination is clear. The fact that the various ‘connections, encounters,…’ identified as being in an event ‘establish what subsequently counts as being self-evident, universal and necessary’ (QM: 249, emphasis added) is an important phrasing. The ‘subsequent establishment’ relates to the ability of a particular group, the particular dominant group, to impose the outcome(s) of an event as self-evident—i.e. as normal, acceptable, even desirable. Genealogy’s task is to uncover and map these disjointed moments, showing where ‘self-evidence’ is freshly imposed on a particular set of social relations.

Foucault is sometimes (maybe even purposefully) vague in stating who constitutes a particular dominant group. What is clear, however, is that there are multiple dominant groups each within particular social spheres: e.g. doctors and psychiatrists in the asylums (1974/2006; 1976/2003a: 7), or the bourgeoisie in the factories and employment (DP: 87, 279-80; 1973/2000). A dominant group is able to exert influence upon social relations—and, therefore, to partially (re)structure them.

Foucault’s conception of domination also includes another aspect: by altering social relations and discourses post-event, a dominant group can create ‘accurate’ knowledge of that change. Importantly, this is not an ‘ideological’ development—i.e. a ‘mask’ obscuring a ‘true reality”—but the ability to structure and focus knowledge toward a particular discursive world view. Domination enables the dominant group to exclude alternative discourses (usually from the various subjugated groups who occupy the same social spheres, asylums, factories, etc.), which are equally as ‘true’ as that of the dominant discourse.
Truth
It is important to note that Foucault’s genealogical work is not just focused on disjunctive events and their absorption into dominant discourses. What makes the absorption so important is that the event is subjected to, and becomes incorporated into, a construction of truth. In the genealogies, truth is understood to be the product of a particular ‘regime of truth’ (Han, 2002: 122-128; Weir, 2008; Foucault, 1977/1990: 111-112). In the interview *Truth and Power* Foucault writes:

Truth is a thing of this world: it is produced only by virtue of multiple forms of constraint. … Each society has its regime of truth, its ‘general politics’ of truth—that is, the types of discourse it accepts and makes function as true; the mechanisms and instances that enable one to distinguish true and false statements; the means by which each is sanctioned; the techniques and procedures accorded value in the acquisition of truth; the status of those who are charged with saying what counts as true (Foucault, 1976/2003b: 316).

Foucault’s emphasis is toward making clear the ability of dominant groups to instil a conception of what is ‘true’—reason over madness, heterosexuality over homosexuality, discipline over variation, etc.—so creating a particular discursive and social environment that promotes a particular discursive position against others that are deemed ‘false’. Foucault’s concern is not to argue that the underdog is somehow more truthful or ‘is’ truthful compared to the ‘ideological’ position of the dominant group. Rather, it is to show how dominant discourses necessarily exclude alternatives and actively work to produce social relations that normalise (*DP*: 183) certain discourses and social relations.

Establishing the grounds of ‘truth’ allows a dominant group to impose these criteria upon others who do not conform to them. ‘The political question, to sum up, is not error, illusion, alienated consciousness, or ideology; it is truth itself. Hence the importance of Nietzsche’ (Foucault, 1976/2003b: 318).
Examples of genealogical studies

Foucault only produced two explicit in-depth studies that use his genealogical approach, these were published as the books *Discipline and Punish* and *History of Sexuality: Volume 1*. A third book, although Foucault was here an editor, is an intriguing collection of essays concerning the case of parricide entitled *I, Pierre Rivière, having slaughtered my mother, my sister, and my brother…* (1973/1975). There are also examples of his genealogies found in a number of the lecture series that Foucault gave during this period (cf. 1974/2006; 1975/2003; 1976/2003a; 1978/2007).

Due to space, only *Discipline and Punish* will be discussed here. In *DP*, Foucault looks to develop a genealogy of the changing form and effects of punishment. Originally operating as the mechanism of vengeance for a wronged sovereign (*DP*: 47-50), punishment focused upon demonstrating the power of the sovereign over the wrongdoer. Torture was also routinely utilised in order to extract the admission of culpability from the accused; evidence may corroborate (and was enough to convict) but it was through extracting the performance of an admission that ‘truth’ was demonstrated (*DP*: 39-40).

But, Foucault argues, beginning in the late eighteenth century punishment started to change its ‘object’ of concern: no longer was it a case of imposing the sovereign’s mark upon a human body (torture, execution, etc.), now punishment was arrayed toward the fictional object of ‘the soul’ (*DP*: 19, 29).

It would be wrong to say that the soul is an illusion, or an ideological effect. On the contrary, it exists, it has a reality, it is produced permanently around, on, within the body by the functioning of a power that is exercised on those punished—and, in a more general way, on those one supervises, trains and corrects, over madmen, children at home and at school, the colonised, over those who are stuck at a machine and supervised for the rest of their lives. This is the historical reality of this soul, which, unlike the soul represented by Christian theology, *is not born in sin*
and subject to punishment, but is born rather out of methods of punishment, supervision and constraint (DP: 29).

This focus upon ‘the soul’ in punishment is a direct consequence, Foucault argues, of the new techniques of disciplining which were developing separately in schools, the army, and workhouses. There was a growing realisation that through disciplinary techniques huge numbers of people—who previously would have required direct oversight to be kept under control—were now controllable through a ‘micro-physics’ of power (DP: 26, 29, 139, 149, 160). This micro-physics not only led to a new form of punishment in prisons—now focused on the (completely reified) notion of ‘the soul’ as the instigator behind acts of punishable behaviour—but to the attempt to establish a new and wider form of wider social organisation based around disciplinary principles. (The success of which is debatable; see Foucault’s discussion of ‘delinquency’ as an unintended, but still recaptured and utilised, consequence (DP: 257-293)). However, what is clear from reading DP is that the establishment of this new form of power led, in Foucault’s terms, to positivities that created new social and discursive relations within which subjects were/are ‘formed’.

Conclusion

Very late in Foucault’s work (1978/2003b: 275-278; 1984/2003b: 56; 1984/1990), he still strongly associated himself with both his archaeological and genealogical work—and certainly did not see the latter as excluding the former. When using Foucault’s methodologies, therefore, archaeology operates to delineate a field within which objects, concepts, and subjects are formed and are given meaning. Genealogy operates to destabilise the assumptions of continuity, origin, and ‘progress’ and to show the series
radical alterations that have taken place and the different relations of domination that are its effects.

The value of these terms for the argument made in this thesis is that both a complex field of relations and a series of mechanisms for explaining how this field changes is possible. However, there is still a complexity and ambiguity in how these two theoretical explanations operate that still needs to be unpacked and analysed. It is to this task that the argument now turns in the next chapter.
Chapter 5
Theory and the Challenge to Foucault

Introduction
As established in the previous chapter, Foucault’s work covered distinct forms of methodological inquiry. As was also discussed, Foucault developed a number of intriguing concepts which he emphasised at particular points during his analyses. Two of these concepts are events and emergence, both of which are of interest to this study. However, Foucault also has an important, but very underdeveloped, articulation of the material world which he opposes to the discursive. This material world he termed the non-discursive, or the extra-discursive. This chapter will investigate in more detail events and emergence as they appear in Foucault’s theory and link them to his understanding of the extra-discursive. Not only will this enable a critical comparison to be made between CR and aleatory materialism, but will also establish the grounds upon which later an integrated theoretical position can be established.

5.1 Foucault and Events
Events in the archaeologies
Foucault’s archaeological studies are his most sustained analyses of how discursive structures produce meaning due to the particular arrangement of the elements contained within them. In the archaeologies, Foucault begins his development of events by focusing on forms of dislocation and disjuncture that can occur within discursive structures. This analysis changes, however, in AK (1969/1972) where events are understood to constitute specific occurrences of discursive impact (i.e. ‘statements’).
Discussed in more detail below, in both *HM* (1961/2006) and *BC* (1963/1994) Foucault links events to affairs external to discourse, but which then impact upon discursive structures. It is in *OT* (1966/1994), however, that events are more clearly articulated as occurring within discourse itself. For example, the move within the Western épistémè, from the Classical to the Modern, forms just such an occurrence. Of central importance, Foucault argues, is Kant’s reformulation of the questions governing knowledge: What is my present? What is the meaning of this present? What am I doing when I speak of this present? (Foucault, 1983/1986: 90, a.k.a. The Art of Telling the Truth; Lecourt, 2000/2001: 89). AK develops further Foucault’s argument that events occur within discourse itself—but all the while the extra-discursive events are acknowledged by Foucault, but excluded from his analysis. This is intriguing because, as the argument below will show, Foucault’s theory relies upon a conception of the extra-discursive from which it operates.

*History of Madness and Birth of the Clinic*

In *HM* events within and without of discourse are largely equivalent in terms of their impact. From the ‘event’ of Descartes arguing that there existed a Western ratio (*HM*: 47), to the ‘event’ of the mass confinement of the mad alongside other so-called “Unreasoned” in 1656 (*HM*: 74, 77), Foucault understands events as ‘occurrences that alter established practices’. Perhaps the largest discursive event that Foucault identifies is within medicine itself. The “discovery” near the end of seventeenth century of the “vapours”—a condition that was meant to affect the nervous system—had a huge impact because it would become, in the eighteenth century, a catch-all category of ‘nervous illnesses’ (*HM*: 203). Foucault argues that the event occurred in moving the treatment of madness away from fringe treatments that concerned ‘magic’ toward a full medical...
discourse. By understanding madness as relating to vapours contained within, or emanating form, particular internal organs, the medicalisation of madness began. The establishment of visibility—i.e. an empirical basis, either through direct observation of autopsies—as the criterion through which madness became understood, enabled a whole new series of practices to develop (HM: 217-9). However, Foucault cautions against overstating the importance of any one particular instance of an event. In discussing the reforms to the French prison system before the Revolution, he argues:

We must meticulously guard against looking for anything that looks like the advent of a major event in the years that surround the reforms of Tuke and Pinel, either that of the positive recognition of madness or that of a more humane treatment of the insane. We should give back to the events of these years, and the structures that made them possible, the liberty of their metamorphoses (HM: 425).

Foucault follows this by arguing that while there was a myriad of institutional levels upon which madness was later reassessed, it was the combination of three on-going aspects that created the appearance of the ‘sudden’ event of the mad being ‘found’ within the prison system. The first was the reduction in spaces available for confinement, as well as the increasing proximity of medical institutions near to these spaces of confinement. Second, there was a new order of the ‘neutral gaze’—a range of observers who were ‘able’ to identify, judge, and guard against madness. Third and finally, madness suddenly became startlingly juxtaposed against criminality: while previously the mad had been confined alongside vagabonds, prostitutes, as well as petty and serious criminals, due to various ‘sifts’ of the confined population only criminals and the mad were left (the other having been moved to workhouses) (HM: 426). In this setting, madness would come to “haunt crime without ever completely reducing it” (ibid.) and is why madness suddenly come to find a place within the justice system. Where once only the criminal
act was worth knowing—and then only in order to pass sentence—now the morality and mind of the criminal was part of the reasoning informing sentencing (HM: 451).

In BC Foucault links ‘events’ to both the particular symptoms that manifest during a patient’s malady, as well as to politics (such as the French Revolution) and the reforms of doctors and medicine that were (partially) linked to this (BC: 28-29). Events, therefore, range in size and form from the body to the body politic. In BC Foucault’s overall concern is to show that changes took place to medical practice, both in terms of medical discourse but also in terms of how medical practice was organised. The subtitle of BC, “an Archaeology of Medical Perception” shows Foucault’s concern with the (newly emerging) form of medical practice that was moving away from using pre-existing typologies that sorted diagnoses before any symptoms were present and, instead, re-organised itself based on the observations of the illness itself.

Foucault charts an interesting development that occurred within the eighteenth century: the advent of medical calculation. Medicine was previously caught between the ‘art’ of medicine and the ‘knowledge’ of inert things—but with the coming new forms of measurement and variables (i.e. the isolation of different but measureable factors that, taken together, could constitute a wider diagnosis), a whole new realm of observation was made possible (BC: 97-8). Medicine “saw each perceived element as a recorded event and the uncertain evolution in which it found itself an aleatory series” (BC: 97, emphasis in original); that is, medicine was suddenly able to divide, partition, and measure a new-found level of the components of disease and sickness. What began to develop, Foucault argues, was the exchange of medical information. Each observation knew that its particular measurement may be fallible (to an extent), but the widespread use of measurement allowed for an attempt to create a general development of a medical knowledge based on recorded observation and measurement. They were not
observations from “a garden of species but a domain of events” (BC: 102, emphasis added)—i.e. each observation was unique and not linked to a ‘perfect’ understanding of illness and disease.

The special attributes (then unknown and unplanned) of the hospital and clinic were that it allowed the medical gaze to observe “the pathological fact [appearing] in its singularity as an event and in the series surrounding it” (BC: 109). What was previously confined to the family environment (i.e. sickness) was suddenly brought into the new context of the clinic—what Foucault would later call a ‘surface of emergence’, to pre-empt his thought by six years (AK: 41). The hospital setting allowed the ‘event’ of the pathological disease to manifest itself in a newly ordered environment, showing its symptoms separately from other interfering factors. However, this is not ‘the’ reason why medical discourse and practice changed, it was just one factor within it. For Foucault, there was already change to the savoir of medicine in the “arrangement of knowledge that determines the reciprocal positions and the connexion between the one who must know and that which is to be known” (BC: 137). The clinic did not alter “the same game, somewhat improved,” but instead it was “a quite different game” (ibid.).

Events in both HM and BC take effect in two linked but separate realms: the discursive and the extra-discursive. Changes within the discourse of medicine altered the means by which occurrences could even possibly be understood—they “changed the game”. This was alongside the chance development of the clinic, situated as it was within the wider setting of the hospital. The two together then altered both medical discourse and practice. But the ‘event’ remains an ill-defined phenomenon in Foucault’s work. It is not until OT that he begins to hone his understanding of events, situating them within discourse itself.
The Order of Things

In *OT*, Foucault investigates profound changes that occurred to the Western épistémè, changes so deep and so wide ranging that he terms them “a fundamental event” (*OT*: 220). Constituted by a number of discursive changes, Western inquiry began to move away from the Classical forms of knowledge and instead to incorporate three new elements: a new discursive framing, new epistemologies, and new concepts—it is these three new things which, together, form what Foucault terms the Modern épistémè. He goes so far as to posit an approximate timeframe for this change: the years 1775-1825. This consisted of two distinct phases: the first from 1775-1795 (seen in the works of Adam Smith in political economy, and A-L de Jussieu and Vicq d’Azyr in natural history) and which consisted of the modification of key concepts in their respective areas (*OT*: 221). The second phase focused on Ricardo for economics (*OT*: 253-262), and Cuvier for biology (263-279). It is worth briefly highlighting a comment that Foucault’s makes later in his argument: this “fundamental event” should not be misconstrued as having happened as though it were some lightening-strike of sudden change:

...the order of Classical thought can now be eclipsed. At this time, from any retrospective viewpoint, it enters a region of shade. Even so, we should speak not of darkness but of a somewhat blurred light, deceptive in its apparent clarity, and hiding more than it reveals;... (*OT*: 303).

This change to the dominant means of inquiry—this change in epistemological perspective—produced a new ontological framework, one that emphasised visibility as the criteria for what is knowable. Objects were beginning to be examined in order to find out knowledge about them; this was distinct from the previous means of assembling and sorting according to pre-determined taxonomies and relational schemas. This new

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81 Foucault purposefully focused *OT* on three main areas in order to be able to complete the study without being overwhelmed by the required research, he selected: natural history/biology, political economy/economics and general grammar.
empirical method of inquiry had the effect of destabilising the representational system of knowledge, as representational systems were unable to account for the new arguments now being generated through the new empirical methods of inquiry (OT: 238).

But the destabilisation of knowledge systems was only the first effect of the “fundamental event”: the second effect was even more jarring to existing practices.

What changed at the turn of the century [during the second phase of change], and underwent an irremediable modification, was knowledge itself as an anterior and indivisible mode of being between the knowing subject and the object of knowledge (OT: 252).

Not only was there an alteration to the means and method of inquiry (from “representation” to “empiricities” (ibid.)) but there was also now a conceptual re-ordering of the space between the knowing subject (whom we might now term ‘the inquiring subject’) and the objects of knowledge (which we might now term ‘the objects of investigation’). This change to the relations between knowledge, inquiry, and the inquiring subject also opened up two other important areas: first, the study of language itself as a set of relations in and to itself and which was not assumed to ‘link’ to the external world; and second, humans themselves becoming objects for/of knowledge.

Foucault’s theorisation of ‘events’, therefore, places them firmly within the realm of discourse. While wars, famines, revolutions, etc. do occur as ‘events’ for Foucault, his concern in OT is to show that the most important events that took place were the discursive changes that altered the framework that generated knowledge—i.e. the change from taxonomy to empiricism. In OT, Foucault is arguing that a major discursive reconceptualisation—the event affecting the Western épistémè—had the effect of reframing what were previously familiar objects, opening them up to completely new modes of inquiry. The scale of this event is huge: it alters the dominant form of inquiry within Western thought. It is intriguing, then, that so soon after arguing for the presence
of such a large event, Foucault develops a position that finds events to be particular moments in discourse: viz. ‘statements’.

_Archaeology of Knowledge_
As outlined in Chapter 4, Foucault’s work in _AK_ develops a much more rigorous position concerning discourses. In an excellent but highly abstract analysis, Foucault turns his focus upon explaining how the relations within a discourse allow a _statement_ to be produced. It is statements that Foucault now terms ‘events’.

However banal it may be, however unimportant its consequences may appear to be, however quickly it is forgotten after its appearance, however little heard or however badly deciphered we may suppose it to be, a _statement is always an event_ that neither language (_langue_) nor the meaning can quite exhaust. [And] it is certainly a strange event… (_AK_: 28, emphasis added).

Although always formed within the confines of a discursive formation, there is no single ‘form’ to statements—i.e. there is no common attribute to all statements across all discursive formations. Statements are events because they constitute a particular discursive moment—a ‘conjuncture’—through which a discourse produces meaning. Statements are: (a) generated according to the rules of formation of the related discursive formation, and (b) become a reference point within a discourse/the discursive formation itself. In a long outline of what constitutes a statement, Foucault argues:

_We will call statement the modality of existence proper to that group of signs: a modality that allows it to be something more than a series of traces, something more than a succession of marks on a substance, something more than a mere object made by a human being; a modality that allows it to be in relation with a domain of objects, to prescribe a definite position to any possible subject, to be situated among other verbal performances, and to be endowed with a repeatable materiality (_AK_: 107, emphasis in original)._

This quote requires some conceptual unpacking for it to fully make sense. Statements exist _within_ a particular discursive formation, meaning that they are produced according
to the particular *rules of formation* that operate within a particular discursive formation. A statement is also able “to be something more than a series of” mere grammatical or textual traces (e.g. is more than a correctly formed sentence or a written word). This is because the structured relations within the discursive formation relate the statement to other things within the discursive formation. To go back to a previous examples, for instance, in religious discursive formations the construction of statements about the ‘soul’ owes nothing to their grammatical correctness to account for their authority. They have authority because within that discursive formation they have both an object to relate to—the concept of the soul—and because there are certain ‘enunciating subjects’ who are able to make claims about the soul. Statements are, in this sense, products of the immanent and situated milieu of their relevant discursive formation (*AK*: 116).

Statements are produced only rarely (*AK*: 120; Deleuze, 1986/2006: 3), which promotes both the *copying* and *re-interpretation* of existing statements. Copies are duplications of a statement, but are not in and of themselves statements (an example is the French typewriter layout listed previously in Chapter 5, *(AK*: 86)). (Re-)interpretation, meanwhile, occurs when there is a dearth or “poverty” of statements within a discursive formation, meaning that endless (re-)interpretations of ‘intended’ meanings are produced precisely because there are so few statements being produced (*AK*: 120). The effect of (re-)interpretation to produce large amounts of text is always associated with a particular discursive formation (as this constitutes the ‘site’ which contains the statement being discussed) but this secondary text is not, itself, *part of* the discursive formation itself in the way that a statement is. (This might be seen as a textual analogy to Foucault’s distinction between language, discourse, and speech: a statement is a construction based upon the infinite possibilities contained within language; forming a definite point within a discourse, a statement then becomes the object of texts that discuss that
statement. These texts are not, in themselves, statements, the texts are mere speech—‘chatter’ may be a better term—that relate to a statement. They could be forgotten about with no impact upon the discourse itself.)

In AK, Foucault argues that the production of statements can be influenced by both discursive and material events. While statements are necessarily always formed as part of the language in which they are constructed, they do not link to “some secret or some root of language (langage) that they have omitted” (AK: 112)—i.e. statements are not the ‘base’ upon which the general language is constructed. Statements are always part and product of the discursive formation in which they are formed. This also means that statements have some relation to ‘external’ events: discourses do not develop outside of discursive formations and discursive formations necessarily have material components to them (see Chapter 4, section 4.2). These external influences have “forms of regularity” that influence the production of statements and consist of:

- Relations between statements...
- Relations between groups of statements...
- Relations between statements and groups of statements and events of a quite different kind (technical, economic, social, political). To reveal in all its purity the space in which discursive events are deployed is not to undertake to re-establish it in an isolation that nothing could overcome; it is not to close it upon itself; it is to leave oneself free to describe the interplay of relations within it and outside it (AK: 29, emphasis added).

It is quite clear that Foucault builds and then maintains a position in which discourse is a realm which ‘exists’ distinct from, but importantly still in relation to, the extra-discursive world. Consequently events can happen in (and therefore ‘to’) both the discursive and the extra-discursive realms. Within discourse, statements are events; however, in addition to this, the extra-discursive also contains events which consist of the upheavals and changes to technologies, economics, and social and political relations. Leaving aside for one moment the issue of how events in one realm may come to affect the other,
Foucault is clear that there can be, have been, and will be impacts between events in the discursive and extra-discursive.

So, how is this any different than Foucault’s argument in OT? OT argued that the Western épistémè underwent a “fundamental event” in the form of the rise of ‘Man’ as a distinct conceptual entity, freed from ‘his’ place in a (pre-determined) taxonomical ordering. In contrast, AK concentrates less on particular examples of events and instead examines the discursive structures that form, contain, and define statements (discursive events). The change Foucault is making is in shifting his emphasis away from merely explaining already-occurred events as ‘changes within discourse’ (e.g. the rise of ‘Man’) to, instead, detailing the discursive structures that are/were in operation at any given time. This elaboration allows him to examine both: (a) the process through which an event is produced in discourse, and (b) how the operation of the extra-discursive becomes filtered through particular discursive relations which give the extra-discursive event meaning (e.g. in one discourse an earthquake is the act of god(s), in another it is tectonic plates shifting). Foucault is making explicit the usually implicit process of ascribing meaning.

In OT Foucault was investigating the:

two great discontinuities in the épistémè of Western culture: the first inaugurates the Classical age… and the second… marks the beginning of the Modern age; [these are discontinuities that] we apprehend in one giant leap, the thing… [that is] demonstrated… [in] another system of thought, is the limitation of our own [NH], the stark impossibility of thinking that (OT: xxii, xv, emphasis added in [NH]).

In AK Foucault seeks instead to investigate further the:

attention [that] has been turned… to the phenomena of rupture, of discontinuity. Beneath the great continuities of thought, beneath the solid, homogeneous manifestations of a single mind or mentality…, one is now trying to detect the incidence of interruptions. Interruptions whose status and nature vary considerably (AK: 4).
The task in *AK*, therefore, is to determine two things: (1) what these interruptions ‘are’, and (2) what constitutes the ‘system’ that they disrupt in the first place. As Foucault says: “I have undertaken, then, ...to describe statements in the field of discourse and the relations of which they are capable” (*AK*: 31). As discussed in Chapter 4, the ‘system’ outlined in *AK* is constituted by the various discursive formations (with their inclusive rules of formation) that operate to funnel experience into categories that enable experiences to be articulated in the first place. Foucault argues that discursive formations can and do link to external events; indeed, one of the tasks of archaeological analysis is to chart changes to discursive formations in relation to external events (*AK*: 168).

However, in ‘relating’ to external events discursive formations operate in two distinct ways: the first is in regard to *time* and the second is in regard to *impact*. Time, in discursive formations, is not necessarily conceptualised as linear. While, of course, discursive formations *exist* in a linear world, they do not necessarily *follow* linear models of time as a means of ordering their elements. Foucault stresses that discursive formations do *not* adhere to the ‘stream of consciousness’ model: here a sense of time operates that “elude[s] itself in its openness to the future and its retention of the past” (*AK*: 169). In short, discursive formations—and the discourses that are contained within them—operate according to rules that are internal to each discursive formation and which only incorporate a conception of time when it is contained *as part of* that discursive formation itself.

Similarly, external events do not automatically have an impact upon discourses—just because something ‘happens’ does not mean that a discourse is automatically altered. Indeed, even a “rupture” (*AK*: 176-7) as big as the French Revolution—an
external events so large it alters the general rules of multiple discursive formations over a very short period—does not have one uniform effect upon discourses (ibid.). Nothing erupts from the extra-discursive (and certainly not from the discursive) in which its effects or manifestation is not a matter of discursive interpretation. It is worth clarifying a point: this is not to make an argument that to cheat death, for instance, all one has to do is to discursively consider oneself immortal; the extra-discursive occurs, operates, and manifests without any consideration for how it is discursively understood. However, what is important for this argument is if an event is registered as occurring it is always interpreted discursively; so death—while permanent for those who die—is articulated by others through their own particular discursive constructs.

**Events in the genealogies**

As highlighted in the previous chapter, after publishing *AK* Foucault altered his theoretical and began to move away from his archaeological investigations. In Foucault's genealogical accounts ‘events’ begin to take on a much more important role as the key component for what he understood to be ‘change’. In the genealogies, *circumstances* surrounding an event become increasingly important both in terms of the discursive and the extra-discursive. Also, the identification of particular groups (where they happen to be present) also rises in importance. Foucault does not attribute direct causal powers to groups, but groups do begin to constitute an important factor in the production of particular events. An example of this is found in *Discipline and Punish* (covered in more depth below) where the bourgeoisie attempted to produce a more ‘disciplined’ workforce through the introduction of the ‘disciplinary prison’.

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82 See the discussion in Chapter 2, regarding CR for a further breakdown of this point.
However, Foucault’s move from archaeology to genealogy was not as sudden as it may appear. Arguably, it is during the period 1969-1971 that Foucault’s interest on the role of events began to accelerate; which led, ultimately, to the genealogical principles he outlined in Nietzsche, Genealogy, History (1971/2003). As discussed earlier, Foucault’s engagement with aspects of Gilles Deleuze’s work began to highlight the way in which events could be situated in both the discursive and the extra-discursive world. Before turning to discuss NGH, a brief reassessment of events as outlined in TP will be made.

**Theatrum Philosophicum**
Foucault’s review of Deleuze’s two books *Difference and Repetition* (1968/1994) and *The Logic of Sense* (1969/1990) included a large amount of Foucault’s own theorisation both about the form and effects of events. To briefly recapitulate the earlier discussion in the previous chapter, Foucault argued that Deleuze attempts to move away from both Platonism (with its perfect Forms and imperfect *doxa*) and empiricism (with its emphasis on observation conveying accurate knowledge about a thing) by placing an emphasis upon *events*. Importantly, events are neither identifiable by their appearance nor are they the essence of a thing unfolding over time—events are incorporeal, they *involve* things but are not (essentially) *part* of things. This rejects both essentialism and Hegelian teleology: an essence does not ‘play itself out’ in the world, quietly expressing its characteristics over time; nor is there some supra-historical force or subject (such as ‘Reason’) that follows a predetermined path. Foucault develops this argument by proposing that conceptions of *metaphysics*, *logic*, and *grammar* all need to be altered in order to incorporate the indefinable ‘aspect’ of events: i.e. they are incorporeal moments that contain a *potentiality* and, as such, are not the ‘fixed state’ of a thing. Foucault
adapts Deleuze’s notion of events, but it is difficult to extract the Deleuzean position from the Foucaultian position to see the additions that Foucault introduces.

Deleuze’s argument is articulated particularly well in a discussion by Rajchman (1991) on Deleuze and Foucault. Rajchman begins by arguing that Deleuze links two terms: the possible and the real. Possibility means “something which might exist but does not” and, importantly, the possible is firmly anchored to the real, “that which does exist” (ibid.: 160). What is possible, therefore, begins from the particular circumstances that constitute each instance of the real. Humans construct thoughts and theories in order to understand both the real and possibilities, leading to the development of concepts. But within thought itself, concepts give equal weight to what is possible and what is real, meaning both are equally substantiated; for to think about either possibles or the real are both merely acts of thought.

But, Rajchman continues, for Deleuze there are also realities for which we do not yet possess the concept(s) necessary to articulate them—and these Deleuze terms the virtual. These virtuals are sometimes actualised, a process whereby new concepts are created in order to make the virtual “seeable, thinkable, or sayable” (ibid.). The process of actualising—of naming—a particular virtual Deleuze terms differentiation: actualised-virtuals are distinguished from both the already-existing real and from other unarticulated-virtuals. Rajchman argues that an ‘event’, for Deleuze, occurs within a:

“virtual multiplicity” [which] is a disparate set of things of which we cannot yet have the concept; and its “actualisation” therefore involves the invention of something which, by the lights of our [current] concepts, is impossible. … An event for Deleuze is not a history or a drama with beginning and end; it is the creative or inventive actualisation of a virtual multiplicity (ibid., emphasis added).

83 I would like to thank Prof. Richard Day for a discussion regarding Deleuze in which he made me aware of Deleuze’s use of Lacan’s notion of ‘event’ being “that which does not signify.”
We must be careful here only to ascribe event to the instance that Deleuze attaches it to: an event is the moment of actualisation—i.e. of ‘making known’ one presently ‘unknown’ real thing or circumstance. This is the moment when knowledge/discourse accounts for the presence of new thing by attributing to it a new concept that previously did not exist. As Deleuze (1969/1990: 53) himself states “events are ideal… there are two courses of events, one of them ideal, the other real and imperfect…. The distinction, however, is not between two sorts of events; rather it is between the event, which is ideal by nature, and its spatio-temporal realisation in a state of affairs.” Colwell (1997: para.8) argues that this moment of actualisation comes as part of a series—a term Deleuze uses to denote the ‘connectedness’ characterising a number of related phenomena. The event is “that which repeats, but repeats differently” (ibid.: para.7); it forms part of the series but its “state of affairs” is different, i.e. something has occurred to alter its constitution, it is amongst a particular series, but is not part of that series. This is where Foucault states that “the event is that which is invariably lacking in the series of phantasm… repetition devoid of any grounding in an original” (TP: 352).

But, in making this move, Deleuze is placing all of the emphasis of what constitutes an ‘event’ firmly within the boundaries of discursive recognition: an event is an event only because discourse could not previously account for a thing or occurrence but now it can. This, in effect, elevates discourse to an epistemologically privileged position: discourse, and not the thing itself, becomes the means by which events are determined. This brings a stark division into Deleuze’s argument. He appears to relegate the extra-discursive to ‘containing’ the content of the event (i.e. the extra-discursive ‘makes’ the situation which is conceptually unexplainable) but, importantly, unless a situation is then discursively recognised as both (a) existing and (b) presently unexplainable it is not, therefore, in Deleuzean terms an ‘event’.
In *TP* Foucault follows closely Deleuze's position regarding events, but argues something slightly different. With firm focus on Foucault's reading of Deleuze, the death of Marc Anthony (see Chapter 4 earlier) can be used again to illustrate Foucault's point. While there most certainly *is* a materiality present (for Anthony did die), this is not an 'event' for Foucault. At this point in his work, he understands events to be the moments when the incorporeal possibilities, the 'phantasms' that can be resultant from particular states of affairs, finally manifest. But as soon as the event manifests it ceases to be incorporeal—and then ceases to be an event. For upon manifestation the phantasm takes material form and is then either 'real' (corporeal and discursively known) or 'virtual' (corporeal but discursively unknown). For Marc Anthony, death comes when out of all the potential outcomes that are possible from his state of affairs, the one which manifests is death. For Anthony, his 'real' materiality as a live human being is over. But Anthony's death also alters the phantasms of those states of affairs that relate to him, expanding or contracting what now might 'come to be' in those other situations.

As discussed earlier, Foucault's argument may seem unnecessarily convoluted—does theory need this level of abstraction to formulate something as miniscule as the instant of an 'event'?—but it is the knock-on effects of Foucault's argument that are important. Foucault's (and Deleuze's) destabilisation of what, ontologically, knowledge and theory can *term* an event allows him to move away from positivism, phenomenology, and teleological accounts (*TP*: 351). This suddenly opens up the possibility of investigating—as far as one can—the states of affairs that surround each event, rather than trying to gain knowledge of the event 'itself'.

This discussion is still before Foucault's move to adopt an explicitly genealogical account, but it marks an important shift in his thinking. In the archaeologies, events are contained within a dualism: discourse and the external world (e.g. changes to the
Western épistémè vis-à-vis war or famine). In *TP* there is a move toward a level of intangibility—a circumstance that, arguably, doesn’t leave him during his work all through the genealogies. In *TP*, his focus is very much upon the *discursive* aspect of events: how can they be understood (if at all) within language? On this formulation it would seem that Foucault is positioning himself in such a way as to argue that events can never be known; they only occur as fleeting instances in which one state of affairs manifests from among many possible others.

*Nietzsche, Genealogy, History and Questions of Method*

Coming only one year after *TP* (and so only two years after *AK*), *NGH* appears as a radical shift from Foucault’s earlier archaeological investigations. His emphasis moves from *discourse* to *relations of forces*. What appears to matter now, in terms of events at least, is not the structured sets of relations found within discursive formations but instead the changes in dominance between different groups, with the dominant group also being able to somewhat ‘call the shots’. This is not to say that Foucault implies that the dominant group decides what they want and then the social and material world cooperatively and compliantly reorders itself accordingly. What Foucault *does* argue—and what the discussion below will expand upon—is that the installation of a new dominant group enables them to begin, and to continue, to alter the world from the moment when they first came into their position of dominance. (To go back to Althusser’s analogy in Chapter 3, they always ‘catch a moving train’.) Furthermore, this dominance is not enacted according to some pre-formulated ‘master plan’, but is itself a series of ‘responses’ to chance events, contingencies, and unexpected outcomes which the dominant group is able to influence (to varying extents), so altering the form and effect of social relations.
Foucault’s understanding of ‘events’ in *NGH* has changed from those outlined in *OT, AK* and *TP*. Instead:

an event... is not a decision, a treaty, a reign, or a battle, but the reversal of a relationship of forces, the usurpation of power, the appropriation of a vocabulary turned against those who had once used it, a domination that grows feeble, poisons itself, grows slack, the entry of the masked ‘other’. ...[T]he world of effective history knows only one kingdom, without providence or final cause, where there is only “the iron hand of necessity shaking the dice-box of chance” (*NGH*: 361; with quote from Nietzsche, *Daybreak*, §130).

This is a dramatic move from the (comparatively) sedate pace of archaeological change. In genealogy events are now placed largely outside of discursive relations, constituting altered social relations. This extra-discursive aspect is further emphasised by Foucault’s elaboration on the issue of ‘chance’: it is not a case of simply “drawing lots” but is, instead, “raising the stakes in every attempt to master chance through the will to power, and giving rise to the risk of an even greater chance” (ibid.)—it appears that, for Foucault, fortune may indeed favour the brave. Events have not only moved in terms of where they now take place (in social relations), but they have also changed in what they are. Extra-discursive events are no longer understood merely as the occurrence of battles, plagues, typhoons, etc., now they occur only when there is a “reversal of a relationship of forces...” (ibid.).

In *OT* and *AK* events were understood as occurring both discursively and extra-discursively (although, of course, the two forms were ontologically distinct). In *TP* the understanding of events had changed to focus on an incorporeal moment in time, ‘a potentiality’, that ultimately manifests but is only knowable through discourse. However, in *NGH*, events seem to have moved almost completely to the extra-discursive. In *NGH*...

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84 See the earlier discussion of Foucault’s concept of power as ‘relations of forces’ in Chapter 5.

85 Cf. *HS*: 100-102. Foucault outlines the ‘tactical polyvalence of discourses’ whereby marginalized groups reverse discourses ‘about’ them, reutilizing and redefining concepts.
it is a matter of (social) relations of force that do not have to be understood discursively at all, by any group: it is position—i.e. dominance—which becomes the arbiter of when an event has occurred. Presumably for the ‘defeated’ group the defeat is soon known (if not immediately), as is the new position of dominance for the ‘victor’. It does not, however, have to follow that other groups not directly affected have to have any understanding that this event has taken place at all.

Foucault argues that, methodologically, genealogy’s task is to uncover the “countless lost events” that constitute history (ibid.). These events require extraction from the totalising and stifling false continuities imposed by theological, teleological, and rational explanations of history which aim “at dissolving the singular event into the ideal continuity” (ibid.; see also Pearce, 2001: 40 n.5).

In Questions of Method (already covered in some detail in the preceding chapter) Foucault’s argument regarding ‘eventalisation’ consisted of examining two specific aspects: the first is the ‘breaches of self-evident’ truths; and second the analysis of “the connections, encounters, supports, blockages, plays of forces, strategies, and so on” (QM: 249) that produce an ‘event-singularity’. This conception of an event—as a particular set of circumstances that necessitates the incorporation of a new ‘truth’—contains several interesting implications. The first is that it is in the extra-discursive that an event is produced. Second, that it is only when truths—which are, obviously, discursively constructed—have to be re-assessed that the singularity counts as an event. Finally, and as Foucault states, this raises questions concerning the distribution of power (Foucault’s “relations of force”) in any given situation. For example, the more stable and entrenched the differential in the relations of force between groups, it is arguably less likely that an event would take place. The more power that is arrayed, the more the influence one group has over both establishing regimes of truth (see Chapter 5) and in
controlling/directing extra-discursive elements. This means that a greater counter-truth/contradiction must occur in order for a truth regime to become threatened or destabilised. The more established and powerful a truth regime is, the more likely it is to shrug off opposition.

Domination and power can also be used constructively to maintain control. The stronger an established dominant group is, the greater their ability to control and direct extra-discursive elements. This gives them a greater capacity to respond to actually occurring events. An example is Foucault’s discussion of the creation of a ‘delinquent class’ (DP: 257-293): an effect of the newly established ‘disciplinary prisons’, delinquents threatened the dominant bourgeoisie—until the bourgeoisie learnt how to control and utilise this newly created group for their own ends and so strengthening their own position (Hardy, 2011: 86-87; see also below).

In his essay *What is Enlightenment?* (WiE, 1984/2003b), Foucault obliquely develops his understanding of what constitutes an ‘event’. “I think that the Enlightenment,” he states, “[is] a set of political, economic, social, institutional, and cultural events…” (WiE: 51). He continues:

we must never forget that the Enlightenment is an event or a set of events and complex historical processes that is located at a certain point in the development of European societies. As such, it includes elements of social transformation, types of political institution, forms of knowledge, projects of rationalisation of knowledge and practices, technological mutations that are very difficult to sum up in one word, even if many of these phenomena remain important today (WiE: 52).

This is very different from the break in the *épistémè* of Western thought that Foucault previously outlined in *OT*. Now the Enlightenment includes a much ‘heavier’ set of factors: society, institutions, knowledge, practices, and ‘technologies’ (meant in the Foucaultian sense). The changes that took place and which altered them, if taken together, form a multitude of both discursive and extra-discursive elements that Foucault
understands to be events. It may be the case that Foucault is using ‘events’ as a catch-all term for all the changes; however, it seems more likely that he understands the disconjunctures affecting each of them as events in their own right.

**An overview of Foucaultian events**

At this stage it might be beneficial to bring together Foucault’s different positions regarding ‘events’. With the multiple theoretical changes Foucault instigated, where does that leave his own conception of both the ontological ‘substance’ of an event and, epistemologically, how can they be ‘accessed’? To state it simply, Foucault appears to have had three relatively distinct positions in how he regarded events (although as I have argued above, he was in practice always moving between older and newer conceptions).

1. In the archaeologies—and in *OT* and *AK* specifically—events ontologically exist in both the discursive *and* the extra-discursive. Epistemologically, only discursive events were truly ‘knowable’ because the changes to discourse that occurred were identifiable.

2. In *TP* and *NGH* the ontology of events changes to the incorporeal extra-discursive. Here they are either the (final) manifestation of one of a multiple number of possibilities, or they are the imposition of a new domination. Epistemologically, it is impossible to ‘really’ know an event as it is either nothing more than an ethereal ‘possibility’ or it can only be known by examining its effects—e.g. changes in domination(s).

3. Finally in *DP*, *QM*, and *WiE*, the ontology of events moves almost completely to the extra-discursive; epistemologically, events are signalled by reconfigurations to ‘self-evident’ knowledge in order to (retrospectively) account for the changes that happened during the event.
Foucault’s emphasis gradually moves toward determining how power relations and discursive relations alter in the aftermath of an event having occurred. Events are unpredictable and almost intangible—the only means of identifying their occurrence is through a corresponding alteration to discursive relations. If such an alteration is detected, then the genealogist should inquire into the circumstances that produced this particular ‘singularity’ that then altered the overall ‘state of affairs’.

However, Foucault’s conception of events also implies a closely related concept, that of emergence. That events ‘occur’ is only one aspect; its corollary is how events are produced—and this is where the concept of emergence is so important.

5.2 Foucault and Emergence
Although less developed than his concept of events, emergence is an important aspect in Foucault’s work. Using it relatively sparsely in the archaeological works, Foucault gives it increased prominence in the genealogies. However, within the genealogical studies there is a tension between two theorisations of emergence: the first being emergence-as-domination, the second emergence-as-process. In NGH Foucault understands emergence as the imposition of a new domination; but soon afterward he argues that emergence can also be the product of a process, as seen in Security, Territory, Population (1978/2007). This process account contains many similarities with Foucault’s earlier arguments in the archaeologies and how emergent objects are formed.

Emergence as domination
It is in his genealogical arguments in NGH where Foucault outlines in the greatest detail his concept of emergence. He begins while introducing three terms that he takes from Nietzsche: Ursprung [origin], Herkunft [descent] and Entstehung, which “designates
emergence, the moment of arising” (NGH: 357, emphasis in original). Foucault argues that ‘traditional’ accounts of history are either forms of teleological essentialism (ibid.: 363) or are metaphysical ideals of continuity (ibid.: 361). What is needed instead, Foucault argues, is a ‘wirkliche Historie’ (ibid.: 259) that:

leaves nothing around the self, deprives the self of the reassuring stability of life and nature, and it will not permit itself to be transported by a voiceless obstinacy towards a millennial ending. It will uproot its traditional foundations and relentlessly disrupt its pretend continuity. This is because knowledge is not made for understanding; it is made for cutting (ibid.: 361).

With the Nietzschean dramaticism put to one side, Foucault uses Ursprung, Herkunft and Entstehung to destabilise key elements of ‘traditional history’ (that events unfold as they are meant to, or that the human subject has an overarching control of their destiny).

After problematising the notion of ‘origins’ in history or historical groups and then criticising the idea of ‘descent’ or lineage in thought, population or society, Foucault uses ‘emergence’ to interrupt the ideal of continuity. Foucault’s conception and use of Entstehung is “the moment of arising,” meaning “[e]mergence is thus the entry of forces; it is their eruption, the leap from the wings to centre stage” and that they “result from substitutions, displacements, disguised conquests, and systemic reversals” (ibid.: 357, 358, 359). Entstehung is the unseen 'happening' (i.e. not just the ‘presence’) of opposing forces conflicting against one another; it is:

a place of confrontation but not as a closed field offering the spectacle of struggle among equals. …[I]t is a ‘non-place’, a pure distance, which indicates that the adversaries do not belong to a common space. Consequently no one is responsible for an emergence; …since it always occurs in the interstice. In a sense, only a single drama is ever staged in this ‘non-place’, the endlessly repeated play of dominations. The domination of certain men over others… (ibid.: 358; emphasis added).

For Foucault emergence explicitly results in the imposition of a new domination (although not necessarily a domination over a defeated opponent) and is always “produced in a
particular state of forces” (ibid.1971/: 357; cf. Foucault, 1969/1972: 45; Bhaskar, 1978/2008: 51). One of the tasks of genealogy, therefore, is to determine what these forces were at a given time. There are three particular ‘states of forces’ that Foucault sees as promoting Entstehung: the first is where a group (or ‘species’ as Foucault terms it) is victorious in fighting against outsiders or to keep elements within itself suppressed; the second is where, with no outside forces, there is a struggle of “egoisms” within a group so that it (in a sense) devours itself through a “splintering of forces”; the third is, again with no outside forces, where the strongest element(s) within a group splits away from the weaker (NGH: 357). This Nietzschean conception of emergence is a position that highlights the struggle between different protagonists in order to dominate—and therefore to define, shape and control—their particular part of the world. Genealogy may be the investigation of the circumstances leading up to the emergent moment of a new domination, but the moment itself always occurs in the ‘pure space of the non-place’.

But is this really the genealogy that is “gray [sic], meticulous and patiently documentary” (ibid.: 351)? Why does Foucault limit himself to only calling ‘dominations’ emergent? Asking this question poses two problems for Foucault’s position: the first is with the ‘object’ of the inquiry itself and the second is with the ‘parameters’ of the inquiry. In arguing that instances of emergence can only occur as a ‘domination’, Foucault is effectively restricting the scope of emergence only to the effect(s) of human contestations—i.e. to those ‘things’ which are capable of imposing Nietzschean ‘dominations’. This immediately rejects other instances that may, in fact, be emergent but are not defined as a domination. The second problem is that genealogy seemingly restricts avenues of inquiry into determining only the ‘state of forces’ (ibid.: 357) that (dis)enable or (dis)allow a particular domination to take place. This effectively excludes other ‘simple’ social relations that may necessarily be present, but which may not be
determined as an active ‘force’ in the sense that Foucault uses it to explain the forces involved in a moment of *Entstehung*.

**Emergence as a process**
The second theorisation of emergence in Foucault’s work is found in both the archaeologies and in the genealogies. This understanding of emergence is different to the domination argument where the emergent ‘entity’ is always a new—and domineering—set of power relations. In this second conception, emergence appears to be a *process*; a very different situation compared to the sudden (and usually violent) appearance of new relations of force. Beginning in *AK*, there are two different areas where Foucault argues emergence takes place: the first is in discourses, the second is in the extra-discursive. In discourses, *concepts* emerge from their particular milieus within discursive formations (*AK*: 62-3, 146), as do *statements* with their “unique emergence” (*AK*: 171). It is the interplay of different relations within a specific discursive formation that produces the discursive constructs of concepts and statements. The ‘emergent’ aspect of their formation is in their creation through—and only through—the particular relations within a discursive formation. Discursive constructs emerge through the combination of unique relations in the discursive formation.

But *AK* also contains an argument for another site of emergence: the extra-discursive. In *AK* Foucault states quite explicitly that the ‘objects’ viewed by discourses are part-created by “surfaces of their emergence” (*AK*: 41). These operate to “show *where* these individual differences [of objects], which according to the degrees of rationalisation, conceptual codes, and types of theory, will be accorded the status of disease, alienation, anomaly, dementia, neurosis or psychosis, degeneration, etc.” (ibid., emphasis added). The ramifications for emergence are that new objects/things form
within particular places, spaces, and sites and then become incorporated into discourse.

While the aspect of the extra-discursive is discussed in specific detail below, it is important to note here that Foucault’s conception of emergence is that it as part of a wider conglomeration of factors. These objects do not themselves constitute a ‘domination’, where they impose a particular interpretation onto the world or into discourse. Their appearance merely occurs and only then do they become ‘understood’ through the filter of the particular discursive relations existing at the time.

It may be countered that this archaeological account is, in fact, superseded by Foucault’s later genealogical emergence-as-domination account. In the genealogies, the emergence of these objects could be explained through their being part of a reclassification under the new domination: i.e. same thing, just understood differently. Not including the appeal to extra-discursive factors (which is argued below), there are two possible counterpoints to this position. The first is that the domination account too easily incorporates a position that the emergent objects occur as ‘a complete whole’. There is no analysis of their formation, so how can Foucault account for their production and not just the act of their discursive defining? If this account is taken to be accurate, then it surely is true that the sophisticated level of analysis present in the archaeologies is lost when Foucault turns to the genealogies (Dupont & Pearce, 2001: 133-134).

The second counterpoint comes from an interesting development in Foucault’s own work. During Foucault’s genealogical writings after NGH, he seemingly did adopt a ‘softer’ conception of emergence. In Territory, Security, Population (1978/2007), Foucault develops an account of the “emergence” (ibid.: 21-22) of the concept of “population” (ibid.: 21-22, 70-74), arguing for its centrality to the production of other new concepts within existing domains of knowledge (ibid.: 76). Foucault argues, for instance, that political economy is an off-shoot ‘domain of knowledge’ from an original seventeenth
century analysis of finances (i.e. the ‘analysis of wealth’). However, it took the concept of
‘population’ to create a new ‘subject-object’ of study and then a new domain of
knowledge to study it (ibid.: 76-77). But this did not happen by some accidental turn of
thought or slip of the quill pen. In an earlier discussion of an eighteenth century issue
that was linked to ‘population’ (the issue of grain scarcity), Foucault argues that:

You could read the principle of the free circulation of grain as the consequence of a
theoretical field and also as an episode in the mutation of technologies of power
and an episode in the instalment of the technique of apparatuses of security [i.e.
‘governmentality’ NH]… (ibid.: 34; emphasis added).

Indeed, Foucault links this process to genealogy explicitly:

Instead of considering [scarcity] in terms of an archaeology of knowledge, I would
like to consider it from the perspective of a genealogy of technologies of power. I
think we could reconstruct the function of the text[s concerning scarcity], not
according to the rules of formation of its concepts, but according to its objectives,
the strategies that govern it, and the program of political action it proposes (ibid.:
36).

The emergence of ‘population’ as a concept does not, seemingly, correspond to his
earlier notion of Entstehung as the “interstice”, the “non-place” or a “leap from the wings
to centre stage” (NGH: 358). Instead, population appears to be a concept that
developed through the various interactions and reverberations between the discursive
and extra-discursive: i.e. it was created from the “constant interplay between the
techniques of power and their object [which] gradually carve[d] out in reality, as a field of
reality, population and its specific phenomena” (1978/2007: 79). Foucault’s conception
of emergence can here be firmly linked to a form of process.

But does this amount to a contradiction or an inconsistency in Foucault's work? If
emergence is meant only to be the dominations of Entstehung, then the gradual
emergence of ‘population’ concept would appear to be at odds with this. Furthermore, if
Foucault himself finds it necessary to depart from the methodology he outlined in NGH,
does this indicate a tacit recognition that a more nuanced approach is required for understanding emergence? Interestingly, process emergence can be conceptualised as being part of an overdetermined process (see Chapter 3). Understood in this way, the particular emergent concept forms under an overarching set of force relations—i.e. the strategies that drive the “techniques of power” (ibid.)—which then orient its general development.

**An overview of Foucaultian emergence**

Developing very closely alongside the argument for *events*, Foucault outlines two different conceptions of emergence in his work. His most detailed account, in *NGH*, relates emergence to the imposition of a new—and fully operational—domination. The second relates emergence to the gradual build-up and integration of particular discursive and extra-discursive elements over time. However, the two definitions of emergence do not necessarily have to be mutually exclusive. It may appear to be an inconsistency in Foucault's own theorising, but it can also be understood as showing the potential in Foucault's thinking that he is able to produce both accounts in the first place. The task then becomes one of how best to integrate both positions into one consistent theoretical position.

As has been alluded to during both the section on events and this section on emergence, both accounts tacitly rely on a conception of the extra-discursive. This appears as an important aspect of Foucault’s theory, as it not only provides the extra-discursive space from which an *Entstehung* domination-emergence appears, but also is a crucial part in process-emergence which forms over time. Although examined in the last main section of this chapter, the extra-discursive will be argued to be a key component of Foucault’s theory, yet one that he radically undertheorised himself. As will
be argued, the extra-discursive acts in Foucault’s theory like dark matter: it must be there for everything else to work, it is just that per se it is never articulated. Its effects are continually observed, but yet Foucault never articulates what it is/might be. It is to this question that the discussion now turns.

5.3 Foucault and the Extra-discursive
Three questions quickly become apparent when examining the extra-discursive in Foucault’s oeuvre. The first two: what and where is the extra-discursive? And the third: how does Foucault integrate it into his theory? None are easy to answer for several reasons. First, Foucault (naturally) changed his ontological position over the course of the 30 years of his writing. Second, his theory developed through multiple inquiries (madness, illness, knowledge, punishment, sexuality, etc.) but was hardly ever articulated into detailed and abstracted arguments (the one exception might be AK). And finally, he bound himself (albeit inconsistently) to a form of Kantian epistemic fallacy (Datta, 2007: 282-3) that hinders his theoretical ability to adequately conceptualise the extra-discursive.

There is already a body of literature that examines the analysis and the effects of the extra-discursive. Some follow Foucault’s own lines of thought (Dreyfus and Rabinow, 1982), others inquire into comparisons or possible integrations (especially with regard to other theoretical perspectives such as Marxism) (Balibar, 1988/1992; Marsden, 1999; Read, 2003; Joseph, 2004), while others directly critique Foucault’s work and object to the manner in which Foucault does not adequately define, integrate or explain the extra-discursive and its interaction with the discursive (Lecourt, 1972/1975; Dupont and Pearce, 2001; Pearce and Woodiwiss, 2001; Datta, 2007; Frauley, 2007; Jessop, 2007; Hardy, 2011). The implicit use of the extra-discursive as a key, but ill-defined, aspect in
explaining the formation of emergent entities or concepts and is a sticking point within Foucault’s theory. This results in him being caught (in DP for example) in a largely descriptive—as opposed to analytic—account of change.

As has been alluded to so far, the extra-discursive plays an important role for Foucault in both events and emergence. Foucault’s *theorisation*, as opposed to *discussion*, of the extra-discursive is clearest at points in the archaeologies. Here he places emphasis upon explaining the interlinkages between the discursive and the extra-discursive (a theme which Lecourt, 1973/1975, picks up upon). In the genealogies, however, the increasing prominence of power relations changes the emphasis Foucault places on explaining the place and operation of the extra-discursive. Building upon the discussion above, two key texts discussing the extra-discursive will be examined: *AK* and an interview entitled *The Confession of the Flesh* (1977/1980).

**The theoretical extra-discursive**

*The Archaeology of Knowledge* contains important refinements to Foucault’s earlier theorisations of the extra-discursive in *HM, BC, and OT*. Rejecting the previously clearer separation of the discursive and the extra-discursive, *AK* incorporates elements of the extra-discursive *into* an understanding of the discursive. The key aspect of this position is Foucault’s argument that discursive formations incorporate elements of the extra-discursive as a component necessary for them to operate (e.g. such as the ‘surfaces of emergence’, or the institutions through which many discourses are able to form). Indeed, it appears that the discursive formation would not be able to operate in the same form, if at all, *without* those incorporated extra-discursive elements.

Foucault’s argument is clearer when one considers the four areas of a discursive formation: objects, enunciations, concepts, and strategies (see Chapter 4). The
argument is that while the discursive formation ‘operates’ in a way that structures what is and is not ‘allowed’ to take place ‘within it’, the discursive formation necessarily requires the introduction and integration of the extra-discursive before this can take place. A discursive formation may, once it has achieved sufficient status and power, reform the extra-discursive world to varying extents. But, importantly, it necessarily needs the extra-discursive in order to form in the first place (e.g. institutions, objects, etc.). The extra-discursive, then, enables not only the formation of a discursive formation, but also key elements within discourses (objects, concepts, etc.), but also the external structures that discourse applies itself through (e.g. the pre-existing social institutions that become “surfaces of emergence” for discursive objects) (Dupont and Pearce, 2001: 145; Pearce and Woodiwiss, 2001). Both HM and BC theorise the complex interaction between the discursive and the extra-discursive in this manner.

In BC (61) Foucault presents a case that the clinic was formed to aid the teaching of medicine, being a site of specimen collation: “[i]n the clinic… one is dealing with diseases that happen to be afflicting this or that patient: what is present is the disease itself, in the body that it appropriate to it, which is not that of the patient, but that of [the diseases’] truth” (ibid.: 59). Indeed, this appears to be an instance of the extra-discursive being specifically organised according to a particular discursive understanding (ibid.: 58). But this organisation was not simply a ‘one way’ discursive ordering: the space was organised according to the (extra-discursive) reality of disease and patients, but the clinic was “probably the first attempt to order a science on the exercise and decisions of the [medical] gaze” (ibid.: 89)—i.e. explicitly around the requirements of the extra-discursive physicality of the doctors themselves. But the medical gaze itself had changed because now it was:
no longer the gaze of any observer, but that of a doctor supported and justified by an institution, that of a doctor endowed with the power of decision and intervention. Moreover, it was a gaze that was not bound by the narrow grid of structure (form, arrangement, number, size), but that could and should grasp colours, variations, tiny anomalies, always receptive to the deviant (ibid.: 89).

*New objects were to present themselves to the medical gaze in the sense that, and at the same time as, the knowing subject reorganises himself, changes himself, and begins to function in a new way.* It was not, therefore, the conception of disease that changed first and later the way in which it was recognised; nor was it the signaletic system that was changed first and then the theory; but together, and at a deeper level, the relation between the disease and this gaze to which it offers itself and which at the same time it constitutes (ibid.: 90; emphasis added).

It is a construction of the ‘space’ that disease could manifest itself within (the discursive spur for the alteration of extra-discursive place); but that construction then reflected back upon the discursive, altering it too. To use again the quote from above, Foucault outlines the complex interactions between discursive and extra-discursive: the clinic “makes possible the integration, in experience, of the hospital modification of constant form…. By means of the endless play of modifications and repetitions, the hospital clinic makes possible... the setting aside of the extrinsic” (ibid.: 110; emphasis added). What was problematic to medicine—and what it latently found beneficial after the formation of the clinic—was precisely that the extra-discursive did not conform to the dictates of the discursive, meaning that a space, such as the clinic, suddenly enabled new ‘reorganisations’ of the ‘knowing subject’.

Foucault’s magisterial *History of Madness* offers similar insights. After the ‘great confinement’ of 1656 where 1 in 100 Parisians suddenly found themselves deemed ‘Unreasoned’ and thus requiring incarceration, the mad became ‘lost’ in the prison system. They were only ‘found’ again 135 years later, a few years before the French Revolution:

…The consciousness of madness evolved during the course of the eighteenth century. It did not evolve as part of a humanitarian movement that slowly forced
the human reality of the mad to be acknowledged…. Nor was it the result of a pressure of scientific need that forced it to be more attentive to what madness actually had to say about itself…. If the mad were progressively isolated, and the monotony of insanity was divided into rudimentary species, that was not thanks to medical progress or any humanitarian approach. The phenomenon was born inside confinement, and it is inside confinement that the keys to this new consciousness of madness are to be found (ibid: 397; emphasis added).

The “discovery” of madness in the prison and hospital system (ibid.: 417-418) is explicitly linked, in Foucault’s work, to the extra-discursive reality of confinement. The isolation of the mad—i.e. their continued incarceration while other groups (beggars, vagabonds, petty criminals, etc.), whom they were originally confined alongside, were subsequently moved out or into other spaces such as workhouses—contributed to the alteration and construction of new discursive formations relating to madness.

But there is also another element to the extra-discursive and madness: the very act of confinement in 1656 was only possible because of the pre-existence of the (then almost totally empty) leper houses. Leprosy was dealt with by exclusion, but when leprosy was seen to be diminishing “the lowly spaces set aside for it, together with the rituals that had grown up… to keep it at a… distance, suddenly had no purpose” (ibid.: 5). But, importantly, “[o]nce leprosy had gone, and the figure of the leper was no more than a distant memory, these structures [the leper houses] still remained” (ibid.: 6). No discourse develops against a tabula rasa backdrop; all discourses form and develop in situ, influenced, structured and constrained by the context in which they exist. The confinement of the mad took place and was only possible because of the (contingent) pre-existence of the empty leper houses.

The political extra-discursive
The most important outline of the extra-discursive that Foucault undertakes after the turn to genealogy in NGH is his argument regarding dispositifs. The concept of dispositif
[‘apparatus’ or ‘social apparatus’] centres around the idea that, upon obtaining a dominant position, a particular group constructs and then maintains a particular discursive and social position. Importantly, this is a position which is to the detriment of others. From this vantage point the dominant group is able to (partially, but continually) influence both the formation of the discursive and the extra-discursive. The dispositif also gives the group the ability to react to unforeseen circumstances. In the Confession of the Flesh (CF) interview conducted in 1977, Foucault describes a dispositif as:

...[First], a thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions—in short the said, as much as the unsaid. Such are the elements of the apparatus. The apparatus itself is the system of relations that can be established between these elements [NH]. Secondly, what I am trying to identify in this apparatus is precisely the nature of the connection that can exist between these heterogeneous elements.... In short, between these elements, whether discursive or non-discursive, there is a sort of interplay of shifts of position and modifications of function which can also vary very widely. Thirdly, I understand by the term ‘apparatus’ a sort of… formation which has as its major function at a given historical moment that of responding to an urgent need. The apparatus thus has a dominant strategic function (1977/1980: 194-5; emphasis in original, except for "[NH]").

A dispositif is both a ‘re-wiring’ of existing meaning—e.g. what it means to be ‘Unreasoned’ (Foucault, HM: 102), what it means to be a ‘worker’ (Foucault, 1973/2000: 82) (see also Gutting, 1989: 278-9)—and the ‘imposition’ of new meanings, that is the discursive connections, between a range of heterogeneous elements (e.g. concepts, objects and institutions). The effect of this is twofold: initially, it changes the understanding and perception of the world from one perspective to another. Second, it gives an ability to ‘shape the social’ by directing and moulding social conduct according to new parameters established by the dispositif’s particular (re)configuration of relations. Foucault gives an example of a seventeenth century dispositif which the French ‘Physiocrats’ attempted to construct in order to set new relations governing the
production and distribution of grain (1978/2007: 37). A contemporary example could well be seen in the rise of the Chicago school ‘neo-liberal’ economics: a discursive formation of ‘neo-liberal’ economics was constructed, successfully installed, and became a dispositif when it formed economic ‘orthodoxy’ in Anglo-Saxon countries in the early 1980’s (Foucault, 1979/2008: 317-324).

While Foucault remained largely silent on aspects such as the generation and formation, the installation and removal, and the means of maintaining dispositifs, he did elaborate on what a dispositif ‘does’. Arguing that a dispositif has two important effects, he linked them heavily to his conception of strategy and strategic manoeuvring:

On the one hand, there is a process of functional overdetermination, because each effect—positive or negative, intentional or unintentional—enters into resonance or contradiction with the others and therefore calls for a readjustment or a reworking of the heterogeneous elements that surface at various points. On the other hand, there is a perpetual process of strategic elaboration (CF: 195, emphasis in original). …

[T]he apparatus is essentially of a strategic nature, which means assuming that it is a matter of a certain manipulation of relations of forces, either developing them in particular direction, blocking them, stabilising them, utilising them, etc. The apparatus is thus always inscribed in a play of power, but it is also always linked to certain coordinates of knowledge which issue from it but, to an equal degree, condition it. This is what the apparatus consists in: strategies of relations of forces supporting, and supported by, types of knowledge. …[T]he apparatus in its general form is both discursive and non-discursive, its elements being much more heterogeneous (ibid.: 196-197; emphasis in original).

Strategically, then, a dispositif can be seen as a kind of ‘management system’ operating to enable relations of forces and particular knowledge (i.e. discursive) positions to mutually reinforce one another (Hardy, 2011). This explicit link to strategy is, arguably, because Foucault saw the dispositif as the mechanism through which a dominant position could be maintained—a position that includes elevating and enabling particular discourses to ‘explain’ (and therefore define) specific occurrences, instances or objects. The dispositif operates as the means by which a particular discursive position is able to
‘access’ relations of forces, allowing it to impose a particular discursive definition upon the extra-discursive and, as far as possible, upon other discursivities as well. It not only enables access to relations of forces, it is also key in aiding the development of new relations of forces: through strategic manoeuvrings, social relations are realigned precisely to try and enable new relations of force (i.e. power) or absorb conflictual or oppositional relations (Day, 2005: 124).

Importantly for the discussion in this thesis, the extra-discursive is not a passive and malleable object just waiting to be ‘defined’ by a particular discursive position: it continually ‘bites back’. This continually demonstrated by the multitude of unexpected events and outcomes that constantly occur. These unexpected outcomes mean that a dispositif must continually operate to repair and/or modify relations between knowledge(s) and forces so as to maintain a dominant position (ibid.1977/: 195; see also Deleuze, 1988/1992). Indeed, it enables a particular programme and its related ‘technologies’ to be operationalised (Foucault, 1975/1995; 1979/2003; 1982/2003; Defert, 1991: 214-5), but also to react tactically to unexpected events (CF: 195-6; 1975/1995: 279-280; 1982/2003: 142).

But there is also a telling phrase Foucault used regarding the apparatus: “a matter of a certain manipulation of relations of forces” (CF: 196). ‘Relations of forces’ is an important component in his understanding of genealogy, events, and emergence, but also a key element in his understanding of power. As has just been discussed, Foucault continually utilised the extra-discursive as an important component in his theory. Dispositifs draw heavily on the extra-discursive by not only containing the (“institutions,” “architectural forms,” and “heterogeneous elements”) as part of their constituent elements, but also because they link heavily into Foucault’s understanding of power relations, discourses, and discursive formations. Dispositifs, in this account, play an
important role in both creating, consolidating and aiding particular power blocks (see Chapter 4) as well as supporting the particular ‘relations of force’ that enable the reproduction of a particular dominant group at a particular time (CF: 203).

An overview of the Foucaultian extra-discursive
As demonstrated in the discussion above, Foucault incorporates examples and assumptions about the extra-discursive into his work at various points. It serves an important dual purpose enabling Foucault to use the extra-discursive as an unseen counter-balance to discourse. He does this by continually relating the discursive back to the extra-discursive. In *HM* and *BC*, the mad and the diseased constitute material entities that discourse could not fully account for, and in attempting to do so were accordingly altered. In *OT* the “fundamental event” in the Western *épistémè* is the development of a new way (i.e. empiricism) of searching for knowledge in the extra-discursive world. In *AK*, discourses are ‘wrapped around’ objects in the extra-discursive—in the case of discursive formations even *relying* on the extra-discursive in order to operate. In the genealogies, emphasis was placed upon the occurrence of extra-discursive struggles and how these enable dominant groups to impose one discursive position in place of another.

Despite changes to the conceptualisation of the discursive in Foucault’s theory, the extra-discursive maintains a largely static position. It operates as the important but unseen ‘Other’ to discourse. The extra-discursive can act as source, impetus, ballast, or destabiliser to discourse. But in each and every instance, the extra-discursive is an important component in the development of discourse.
**Conclusion**

Continuing the arguments begun in Chapter 4, this chapter traced Foucault’s use of three very important concepts: events, emergence, and the extra-discursive. All three were shown to alter over the course of Foucault's work, gaining and losing attributes as they were changed as parts of Foucault’s theorisations. Importantly, both events and emergence were argued to link to the underlying concept of the extra-discursive—and through this, it was argued that an underlying system of linkages could be identified. However, Foucault’s use of the extra-discursive was argued to be largely incomplete because he never adequately accounted for its development.

As the next chapter of this thesis will argue, it is through the extra-discursive that Foucault's work becomes most open to integration as part of a wider theoretical project. With the arguments of CR and Althusser already developed, it is Foucault's use of the extra-discursive that provides the basis for both integrating aspects of Althusser’s aleatory materialism and for demonstrating the best way to integrate CR as a theoretical ‘underlabourer’. It is to this task that the thesis now turns.
Chapter 6
Theoretical Integration

Introduction
The arguments presented so far have all been directed at elaborating in detail the theoretical arguments of CR, Althusser, and Foucault. Each has been outlined and critiqued in order to reach this point: the task of linking them through a common theoretical framework. Each theory brings with it a different emphasis. With Althusser, the focus is the ontological account of social structure and institutional change. With Foucault, the emphasis rests more heavily on an epistemological account and in understanding the construction of discursive structures. With CR, meanwhile, an account of social process and social causation is elaborated. The purpose of this thesis—and specifically of this chapter—is to bring together the three theories in order to provide an integrated theoretical field of ontology, epistemology, and process. By creating this new perspective, a joint materialist and discursivist argument can be developed that does not reduce the social to either the material or the discursive. Instead, the social world is understood as a mutually reinforcing complex of social and natural structures that continuously interact and which create a multitude of effects.

Most importantly, it is CR that acts as a bridge between Althusser's and Foucault's arguments. CR enables the development of a non-reductionist materialism: i.e. material objects have both properties and powers but, importantly, these attributes do not necessarily have primacy over social relations. By utilising CR's systematised concepts of events, emergence, and the material/extra-discursive, CR deepens Althusser and Foucault's (very different) arguments for the material basis of social relations. This is
not, it is worth saying, to renege on the point just made above and argue obliquely that
the material has primacy over the social. No, instead the argument that CR helps to both
expand and to deepen is that social relations are necessarily situated in material
relations. As will be argued below, both Althusser and Foucault argue this point—albeit
in their different ways. Using CR precisely allows for this similarity to be identified and
developed. From a CR perspective, the social world cannot be explained through social
relations alone: relations exist as they do largely (but not in whole) because of the
inherent properties of the objects and entities contained within social relations.

It is precisely the arguments found in Althusser and Foucault that allow this
position to be developed in such depth. The complex understanding that Althusser and
Foucault bring to understanding events, emergence, and the extra-discursive enables
the framework set out by CR to become ‘active’—i.e. while CR may argue for a particular
construction of events, CR has no examples of engagement with events. CR is
necessarily comprised largely of philosophical abstraction, what is required is to give it
complex social content: and it is precisely this that is found to be so valuable in
Althusser’s and Foucault’s research. It is this task of integration that is undertaken here.

The structure of the chapter is based around the three ‘linkage concepts’ that exist
between all three of the different positions: events, emergence, and the extra-discursive.
Events constitute the main means by which each of the three theories account for social
and discursive change. Events can range from the mundane to the radical, but a strong
case can be made that each instance of change constitutes an ‘event’. Emergence,
meanwhile, will be argued to constitute a sub-category of events. All instances of
emergence can be understood to constitute an event, but not all events contain emergent
entities or powers. However, defining emergence as a sub-category of events in no way
implies that it is somehow diminutive. Importantly, each instance of emergence implies
the production of a new entity or power that is explanatorily irreducible. The scale may be small or the scale may be large—the creation of a water molecule or a social revolution for instance—but in each instance it is seismic in terms of its social and/or natural reconstitutive effects. The extra-discursive, meanwhile, plays a hugely important part in shaping both the context of events and the content of events, but is generally poorly theorised in both Althusser and Foucault. For Althusser, the material did take on an overly determining emphasis in his work; the value of aleatory materialism is precisely that this was reduced, but aleatory materialism was never fully completed as a theoretical position by Althusser before he died. For Foucault, the extra-discursive was shown to be a hugely important part of his theory, but suffered from Foucault having never fully theorised what the extra-discursive was or how it operated in relation to discourse. It is these three concepts, events, emergence, and the extra-discursive, that this chapter will begin to integrate.

6.1 Integrating the Core Concepts
Events
So far in this thesis events have been understood in three different ways. For CR events constitute a conjuncture of different mechanisms at the level of the ‘actual’. The event may or may not produce an outcome but, either way, any time there is an interaction of operating mechanisms it is classed as ‘an event’. Where an effect is produced it may: directly effect an object, it may reform an object, or may lead to the formation of an entirely new object (be it emergent or a compound). For Althusser, events were not differentiated in the same way as for CR. In aleatory materialism events were understood in two different ways. The first is the “swerve of the clinamen” (section 3.2) that occur in the void. These interactions produce the structures that constitute both the
natural and the social world. This is the account of chaos (elements drifting in a void of possibility) leading to a form of semi-enduring stability. The second aleatory account is in the diachronic operation of social structures and systems—e.g. the break up of feudalism and the rise of industrial capitalism. Here, events are the process of social structural change. Finally, for Foucault, events were understood differently in both the archaeologies and the genealogies. Archaeological events constituted either the irruption of a new discursive regime (e.g. an épistémè) or as production of discursive markers ("statements") that operate as the internal structure to a discourse. Genealogically, meanwhile, events are understood to be the reconfiguration of discourses and social relations resulting from changing power relations and new dominations.

With CR as ‘underlabourer’—as Bhaskar termed it—between Althusser and Foucault, CR operates as a stable ontological point from which to look to integrating the two theories. Beginning with Althusser, CR's ontological and epistemological positions quickly highlights the following things. The ‘clinamen swerves’ easily maps onto the distinction in CR between mechanisms (based in the ‘real’) and their conjunctures (in the ‘actual’), the product of which can be new entities. Aleatory materialism's second understanding of events, that of changes to social structures (the change from feudalism to capitalism), are explainable through CR's account of social structural change. This aleatory materialism easily sits within the argument made in Chapter 2 regarding social structures. In CR social structures were argued to take the form of either social relations (regularised social interactions, e.g. a friendship group) or institutions (formalised social interactions, e.g. a corporation). It is institutions that imbue certain social agents within

86 This aspect of aleatory materialism is discussed in more detail below in the section on emergence.
them with emergent power(s) that emanate from the social structure and not previously held by the individual agents themselves.

In relation to Foucault, CR has relatively little to say about discursive change beyond making the argument that all knowledge is produced from within existing cultural (i.e. discursive) constructs—although recent works by Pearse and Woodiwiss (2001), Datta (2008), Elder-Vass (2011), and Hardy (2011) are developing this further within CR. However, CR does have much to offer in regard to events as outlined in the genealogies. CR can certainly engage with Foucault’s argument that events are “disruptions to established truths” (Foucault: NGH, QM, DP, SMBD; Weir, 2008). Foucault’s genealogical argument is very similar to the empirical/actual distinction found in CR. In Foucault’s account, disruptions to established knowledges become synthesised through a ‘reworking’ of accepted truths (or are ‘imposed’ by a new dominant group which later forms as a ‘truth’). This is very close to CR’s argument that events happen in the actual and human subjects only experience a tiny sliver of that event because they are based in the empirical. Foucault’s argument mirrors this CR position because events happen and they may, or may not, become captured by the dominant group. At the very least the socially identifiable effects of the event are captured.\(^{87}\) In this way the effects of Foucaultian events are similar to events in CR. Changes to social structures (both relations and institutions) are one type of effect that can come out of Foucaultian events, but it is the discernable (for CR read ‘experiential’) effects that are recaptured by powerful groups. With CR’s ontologically deeper account of events, it provides a much more sophisticated argument for how extra-discursive (discussed in detail below) events

\(^{87}\) An example of this is outlined in the discussion on disciplinary prisons creating ‘delinquency’. 239
become captured through new or existing discourses. This can go some way to protecting Foucault from charges that his account of events is still ‘too discursive’.

*Integrating events*
CR clearly shows a compatibility between itself and both Althusser and Foucault. By emphasising the background interactions that take place during an event’s conjuncture, CR argues for both (i) the necessity for theory in articulating an event, and (ii) the complex interactions between observable and unobservable social (and natural) forces. However, this linkage has a knock-on effect itself. As both Althusser and Foucault are now linked through CR, they are, with one degree of separation, now linked to each other. It is possible, therefore, to begin to integrate their two accounts of events and social change.

Althusser’s aleatory materialist account of social structural change can be argued to share more than a passing similarity to Foucault’s. If Althusser’s account is seen to focus explicitly (and arguably to its own detriment) exclusively upon *structural* change, then Foucault’s can equally be argued to focus heavily on the *discursive* elements of change. However, with CR integrating them, they can be understood to share a common connection: the interlinkage of background forces/structures and foreground discursive experience. In this way the under-articulation of discourse by Althusser and the under-articulation of the material by Foucault, becomes transformed, through CR, into a mutually constituting relationship.

Of course, this is not meant to imply that simply bringing CR in to Althusser’s and Foucault’s work is a *fait accompli*. Further discussion is most certainly required, beginning first with the three different accounts of *emergence*. 

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Emergence
So far emergence been shown to operate in any developed way only as part of CR. It also exists, although much less developed, in Foucault’s work. Althusser, meanwhile, did not develop the concept hardly at all, but his aleatory materialist account would appear to come close to articulating a form of emergence. However, this variation between the three accounts only means that more theoretical labour is required to integrate the idea of emergence. Importantly, it does not impede the argument that emergence is best understood a sub-category of events.

Viewing emergence as a sub-category of events means that for an entity or power to be emergent, it must happen either during a specific event or as the result of a specific event. This conceptual distinction—in making emergence a sub-set of events—is significant because it ascribes a level of importance to emergence that may otherwise be overlooked: emergence is explicitly linked to events. In terms of social relations, this means that any instance of emergence must be correlated with a particular conjuncture (i.e. an event) that produced the emergent entity in the first place. So wherever there is an identifiable emergent entity, there must have been an associated event.

CR easily provides the most detailed account of emergence. Bhaskar et al relate emergence to the outcome of processes that (re)structure the different component parts of an object, giving rise to new emergent powers or to a new entity entirely. Using the concept in this way enables CR to explain the irreducibility of emergent powers (and even entities) that are not already contained amongst their constituent elements/parts. Foucault, meanwhile, in his genealogical discussions heavily links emergence to “new dominations.” It is the domination itself that is characterised as being emergent—i.e. as being a set of relations not previously present. Foucault steers away from understanding emergence as a ‘combination’ of elements, instead arguing that domination appears as a
fully-fledged power structure. The only problem the new dominant group faces is in having to develop and establish their new domination through techniques and structures left amongst the ruins of the preceding dominant group (e.g. disciplinary techniques applied to the previously incarceration-only prison). However, as was argued in Chapter 5, Foucault does implicitly adopt and account of emergence that focuses process, a far cry from domination emergence that Foucault explicitly discusses. It is this process emergence that has the most similarity to CR.

The aleatory materialist framework, in contrast, has very little discussion of emergent entities. However, the proximity of philosophical perspectives between Bhaskar and Althusser is such that very little needs to be done to integrate aleatory materialism into a CR framework. Taking first the explicit aleatory materialist argument sketched out in Underground Current of the Materialism of the Encounter, Althusser’s position of the “swerve of the clinamen” (already identified to constitute an ‘event’) can be seen to easily accommodate a CR understanding of emergence. Initially, the meeting of elements—which, importantly creates new objects—can be quite easily defined as constituting emergent objects. It is this process of formation that makes them emergent, for it is only when the structures finally exist that they can be understood to be ‘emergent’—for they did not exist as structures before the event that formed them.

In the aleatory materialist argument, it also follows that as more and more structural forms become crystallised, they begin to have an increasing effect and influence upon other elements. This is Althusser’s argument that existing structures can ‘capture’ other elements/forces and ‘absorb’ them into existing forms. This means that elements can either (a) partly form (but do not alter) an existing structure or (b) that they

\[\text{formation}\]

\[\text{capture}\]

\[\text{absorb}\]

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88 n.b.: Elliot’s earlier quote (1987: 330 fn.5) of Bhaskar who said to him in an interview that Althusser was the “foremost Marxist philosopher” influencing his work.
are emergent *per se* but do not emerge as something new, i.e. they emerge as a copy of an existing structure. Not all emergent things/objects are necessarily ‘unique’.

The second part of this account is that as the world becomes more ‘cluttered’ with different objects and entities, dominant structural forms are more likely to become established. The chance of wholly new emergent entities forming is sizably reduced—or, at the very least, that the variation in the types or forms of emergent entities becomes more heavily defined by existing structures (due to their immanent effects). To contort a cliché, in the same way that “possession is nine-tenths of the law,” actual existence overdetermines nine-tenths of possibility. The more structures are established and entrenched, the less likely new emergent forms will either appear; and if they do, it is questionable whether they will maintain enough structural integrity to endure long enough to produce their own alternative effects.

**Integrating emergence**

By situating emergence as a sub-category of events, emergent entities occur in specific circumstances. This is an important distinction because it begins to give a procedural ordering for how social theory might begin to understand the process of formation for entities or structures. The benefit is that when something has been identified as being emergent, it follows that it *must* have come from a particular event. It is identifying the parameters of the event that produced the emergent entity that are of most use to theory. In this way, CR enables Foucault’s work to be given added rigour, but without producing stultifying constraints. Maintaining the complexity of Foucault’s theory is important as, among other things, it is the dynamism with which he investigates social change that makes his work so useful.
Similarly, the shift of emergence into the category of events enables aleatory materialism to begin to distinguish the difference in outcomes that are possible from an event. Althusser’s argument can distinguish the production of structures and objects, but there is little he (or Balibar) mentions in regard to identifying properly emergent entities. By bringing in a distinction of this kind, aleatory materialism is able to make a more nuanced argument regarding the type of structure or object produced.

Linking back to the earlier discussion of events, this integrated position can begin to construct an argument regarding emergence that echoes the earlier position on events. There remains the distinction between a background of processes and a foreground containing both discourses and experiences (the link was made to the real/actual vs. the ‘experiential’ empirical in CR). By introducing emergence to this a distinction can be made between processes that maintain, produce, or reproduce different structures and objects. These distinctions are not just semantics, by being able to distinguish if an object or structure is emergent (or not) implies that (a) an event must have taken place, and (b) that—if emergent—a conjuncture different to the norm must have occurred to produce this emergent outcome.

The extra-discursive
A key component of both events and emergence is the extra-discursive. ‘Materiality’ took prime position with Althusser, while for Foucault the extra-discursive was important but undertheorised. In CR, meanwhile, a critique was developed that attempted to account that a wider number of theoretical forms. As previously outlined in section 2.2, the critiques by Benton (1981/1998), Archer (1995), Datta (2007), Pearce & Woodiwiss (2001), Frauley & Pearce (2007), Pearce (2007), Hardy (2011), and Elder-Vass (2011), all develop a position that places greater emphasises the dual importance of social and
discursive structures. This perspective argued convincingly that social structures (in the form of institutions) exist ‘additional to’ the human agents that constitute them, as evidenced through their supra-individual power relations. Similarly, by arguing that reasons and motives (which CR sees as ‘causes’ in their own right) are in fact part of discursive structures, CR becomes less scientifically focused and a much more congenial philosophical ‘underlabourer’ for wider research (Benton, 2007: xii).

Within CR, there is a clear split between the discursive and the extra-discursive. The real, the actual, and the empirical all consist largely of the extra-discursive; only a small part of material reality is experienced by humans and then, as nearly all human experience is mediated through discursive constructs, this is where discourse plays an important part in CR (Bhaskar, PN; Pearce & Frauley, 2007).89 This, however, brings to the forefront a distinction within CR between the extra-discursive as experienced and the extra-discursive as theorised. For CR, human experience is necessarily mediated through the knowledge-constructs that exist in any particular socio-historical circumstance. However, despite the discursive construction of knowledge, it is possible to postulate the existence of extra-discursive reality through the construction of (fallible) theoretical arguments. It is through this generation of theoretical constructs that ‘additional to experience’ accounts are made possible. (This echoes elements of the Foucaultian/Deleuzeian distinction of the ‘actual’ vs. the ‘virtual’ outlined in section 5.1.)

In regards to Foucault, his reliance upon some form of the extra-discursive is coming under increasing scrutiny and critique regarding its theoretical underdevelopment. Possibly an explicit attempt to jettison the intellectual millstone

89 Although it must be stated that CR also argues that reasons can be causes—i.e. that discursive constructs can be motivators for human conduct. As all reasons are necessarily discursive constructs, this is CR’s second use of discourse/the discursive.
almost automatically acquired by anyone using the term ‘materialism’ in French academe during the 1960s and 70s (n.b.: Lecourt's (1972/1975) discussion), Foucault promoted a highly discursive focus in his work. However, in Chapter 5 his arguments have been shown to include quite intricate and on-going engagements with the extra-discursive. This can take the form of ‘objects’ that are wholly or partially formed and engaged with by discourse, but also as an alternative ordering of powers and possibilities that encroach onto, and even into, discourse itself. As was previously argued, the extra-discursive is the ‘dark matter’ of Foucault’s theory: it must exist for his other components to work, it is just highly difficult to discern and to articulate.

However, by introducing CR to Foucault’s theory, the following two developments can be made regarding the extra-discursive. First, the extra-discursive can be understood to be operating in parallel to the discursive—but not necessarily in concert with it. This is a rejection of Foucault's more overt “nominalist” position (Datta, 2007; cf. Foucault, HS1). The extra-discursive and the discursive do not fully complement or determine each other, meaning that unpredictable outcomes remain a constant occurrence. Second, CR aids Foucault in articulating the form of emergent entities. By developing further Foucault’s ‘process’ account of emergence, not only is the gradual development of particular entities and discourses explained, but the same argument can be expanded to include the analysis of ‘dominations’. The reverse cannot be said of Foucault's own account of ‘domination emergence’: using a Nietzschean concept of emergence to does not provide an adequate account for the development of an emergent power or entity. For Foucault, therefore, the extra-discursive provides a much needed argument for the flipside of his discursive coin.

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90 That is, the extra-discursive does not absolutely inform or dictate the content of the discursive and the discursive does not fully define and form the extra-discursive.
For Althusser, CR provides a bridge via the extra-discursive to account for the operation of the discursive world (a development courtesy of Foucaultian theory). The extra-discursive also deepens aleatory materialism's conception of the material world. As outlined in Chapter 3, the arguments regarding the clinamen in the void, the 'prise' of structures, and the crystallisation of structural forms now have a much more persuasive account. Using the breakdown in CR between real mechanisms, actual events, and empirical experiences, aleatory materialism is able to account for the causality of structural interaction in much greater depth. This, arguably, overcomes some of the problems of articulating the process of change: the distinction accounts for the apparent stability of the world, but also for the possibilities of change. Once a structure or form has been produced, it becomes more likely that it will become reproduced. Structures and forms are sometimes capable of promoting an overdetermination of similar elements—e.g. the rise of industrial capitalism meant that alternative means of production (e.g. individualised means) were reduced to virtually nil. The new structural form had the effect of creating conditions conducive to its own reproduction, and it is on this point that the discussion can turn to the concept of overdetermination.

Integrating the extra-discursive: discursive formations, dispositifs, and overdetermination

The above discussion of the extra-discursive has produced an important distinction: in both Althusser's and Foucault's arguments there exist a number of 'mid-range' structures. Neither wholly background (the extra-discursive) nor wholly foreground (the discursive), there are structures that partly 'guide' and 'shape' the social world. The complexity of these structures (and the difficulty in developing adequate theoretical accounts of them) comes precisely from their position between the background extra-discursive and the foreground discursive. For Foucault, discursive formations exist as
configurations that are at once part-material and part-discursive. Meanwhile, both Foucault and Althusser utilise the idea of *dispositifs*: structures operating as a means of reconciling the irreconcilable—albeit with the distinction that for Foucault they have a material presence, while for Althusser they are theoretical constructs. Finally, the effect of these mid-range structures is to overdetermine the social processes over which they have influence. These three concepts, discursive formations, *dispositifs*, and overdetermination are important for understanding discursive/extra-discursive interaction.

Foucault’s argument for discursive formations does not have an equivalent in either Althusser or CR. The concept of discursive formations produces an account that details how the four key elements of a discursive formation (objects, statements, concepts, and themes) are structured in relation to each other. The discursive environment (the ‘discursive conditions’) that is formed by these relations creates the *conditions of possibility* for discourses to emerge. Importantly, while a discourse is necessarily constituted by discursive statements, a discursive formation must incorporate the extra-discursive in order to form and to operate. The ‘objects’ that Foucault identifies as being necessary for a discursive formation are the link (as Lecourt, 1972/1975, argued) between the *construction of knowledge* and the *reality* that the knowledge is meant to relate to. This thesis has argued that Foucault unwittingly lost this link by moving almost wholly to descriptive accounts in the genealogies. By providing an adequate theorisation of the operation of the extra-discursive in the *process* of creating knowledge, it can be regained. Discursive formations, then, are an integral part of the construction of discourses—they are a discourse’s *pre-condition of existence*—and as such actively pre-determine the emergent discourses from within them. Yet they always exist as a semi-material, semi-discursive object.
Both Foucault and Althusser have concepts of dispositifs/dispositives. For both theorists dispositifs operate to reconcile conflicting elements, forces, or events. For Althusser a dispositive is a purely theoretical construct, an aid to the philosopher or the inquiring theorist to help them theorise an alternative to a seemingly intractable concrete conjuncture. For Foucault, a dispositif is a means through which a dominant group is able to (re)capture unexpected eventualities or to reconcile discourses that suddenly conflict. Within these two conceptions of a dispositif (one theoretical-abstract, one real-concrete), the extra-discursive takes on two distinct forms. For Althusser, complex extra-discursive conjunctions have to be turned into theoretical objects in order to break them down into their constituent components. The extra-discursive is a problem, it is the conjunction that must be theorised in order to destabilise it and—hopefully—to change it. For Althusser, the extra-discursive is largely static and requires theorisation to potentially make is malleable again. In contrast, Foucault's concept of a dispositif necessarily relies upon extra-discursive elements in order to operate (see section 5.2). Ironically, it is through the dispositif that, in Foucault's work, the extra-discursive takes on a much more dynamic role. The dispositif takes on an important capacity as a 'rapid reaction' system that aids a dominant group in responding to threats to their power.

What is clear in both accounts, then, is that the extra-discursive plays an overdetermining role. For Althusser account, a dispositive is a theorised (i.e. abstracted) version of a static concrete extra-discursive conjuncture. Overdetermination comes from these concrete relations, influencing other possibilities and other relations. For Foucault, the dispositif is a means to influence possibilities and relations. As a dominant group, there is no point to a dispositif if it does not provide this influence—and this influence Foucault himself called “overdetermination” (CF: 195). Without wishing to overstate the case for overdetermination, the ability to ‘shape possibilities’ means that events—and
even emergent forms that are only known post hoc—are partially constructed through a prism.\textsuperscript{91} ‘Overdetermination’, therefore, does not mean simple ‘determination’—for there are obviously many events, natural and social, that are not successfully controlled—what it does mean is that the continuous churn of events and social interactions that give the (re)formation of the social world its fluidity always take place, and are always shaped, within an existing context. Precisely because events are immanent, i.e. they always take place within a social and material context and are never ‘prepared earlier’ and then ‘delivered’, overdetermination means certain outcomes are more likely to occur than others. Materially, it is the likelihood that a particular structural form will result from a conjuncture; socially, it is the ability to respond to those events that do not fit a desired pattern and attempt to nullify or alter them. They are both what is meant by overdetermination. In order to illustrate this position, two examples are discussed below.

\textbf{6.2 Two Examples of Integrated Analysis}

The outcome of this integration is that both Althusser’s and Foucault’s works are now able to ‘talk’ to one another. This moves beyond just using them as a productive dichotomy—i.e. with one ‘explaining’ structure and long-term social stability, the other ‘explaining’ discourse and agency. By integrating them into a common theoretical framework it anticipates and avoids the danger of becoming a syncretism that all too

\textsuperscript{91} It might be argued that a dispositif is nothing more than a more ‘politicised’ version of Foucault’s argument regarding governmentality. There is a kernel of truth to this, for the two concepts contain similarities. However, the key distinction in Foucault’s dispositif is that it specifically operates on a political and strategic basis precisely to respond to crises, unexpected events, etc. Governmentality (chapters 4 and 5 of Foucault’s \textit{Security, Territory, Population}), alternatively, argues for the society-wide “governance” of actions. While governmentality is a very useful theoretical tool, it is heavily integrated into Foucault’s genealogies. Ironically, given the level of materiality it is meant to structure, Foucault spends comparatively little time actually theorising the extra-discursive. This is why the argument presented here combines both archaeology and genealogy.
readily awaits the unaware or the gung-ho theorist (see Hirst’s (1982) critique of Giddens on this charge). The benefit of this position is that while disagreements between the two theories continue, the disagreements now become intelligible by the other: disputes cease to be zero-sum confrontations and instead becomes disputes of degree. In other words, where previously Althusser’s and Foucault’s work would have been in conflict due to competing claims of what element is ontologically dominant (to summarise brutally, ‘structure vs. discourse’), now the distinction is between the level of emphasis placed upon one or the other.

Whether the emphasis placed by Foucault in The Order of Things on the discursive emergence of the Modern épistémè, or Althusser’s in Reading Capital on social structural reformation generating industrial capitalism, the divergence between the two has now shifted. The importance of discursive structure and the importance of social and material structures are not matched. This was achieved using CR to create a coherent interlinkage between the extra-discursive and the discursive. In this way it becomes possible to argue that the under-theorised elements of Foucault’s work can quite easily accommodate Althusser’s aleatory materialism. In other words, when seeking to explain the social world both explanations rest partially upon the other: the discursive relies upon the material and—barring the wider natural world—the material relies partially upon the discursive. CR makes explicit the causal powers of both realms, but also the form in which one affects the other. With this distinction in mind, two

92 Two caveats are important to state here. (1) This does not include the more extreme aspects of ‘the linguistic turn’: language is quite capable of becoming a system in itself and potentially quite devoid of any reference to the material world at all. (2) The ‘wider natural world’ mentioned here is a reference to wider eco-systems that are not reliant upon human interaction in order to be maintained—an example might be a building that requires human construction and maintenance to sustain its form compared, for instance, to the amazon rainforest. The Amazon is impacted by human activity—from deforestation to acid rain—but it is not reliant upon human activity to sustain itself.
brief examples will be given to show how the three theories (CR, Althusser, and Foucault) might be fruitfully intertwined.

**The rise of the disciplinary prison**
Out of all three positions it is Foucault's work which consistently contains the most detailed empirical accounts. For this reason, a brief discussion of one of Foucault's more famous studies will be used to bring in both CR and aleatory materialism as a means of further bolstering his account.

In *Discipline and Punish*, Foucault outlined how complex interactions of power, discourse, and the extra-discursive produced the prison system as we understand it today. This began with punishment changing its form, moving away from a model based upon the retribution of a wronged sovereign and instead becoming an attempt to install an all-encompassing system of oversight, direction, and control. However, this attempt failed: while there was a move away from the norm of retribution, the hope to create a new norm of discipline did not manifest as envisaged. “What replaced the public execution was not a massive enclosure, it was a carefully articulated disciplinary mechanism—*at least in principle*” (DP: 264; emphasis added). Despite the strong position of the *savoir* of discipline, it ended up producing unexpected effects—one of these was the creation, via the newly reconstituted prison system, of a ‘delinquent’ population.

To go into more detail, Foucault argues that the prison should not be understood as developing through cyclical and repetitive stages of ‘prison, failure, reform’, but instead as being constituted by:

93 A version of this example, but looking only at Foucault and CR, has been used in Hardy (2011: 84-87).
A simultaneous system... superimposed on the [previous] juridical deprivation of liberty; a fourfold system comprising: the additional, disciplinary element of the prison...; the production of an objectivity, a technique, a penitentiary 'rationality'...; the de facto reintroduction, if not actual increase, of a criminality that the prison ought to destroy...; [and] the repetition of a ‘reform’ that is isomorphic, despite its ‘idealism’, with the disciplinary functioning of the prison... (ibid.: 271).

Prison has a form and function quite peculiar to itself, meaning delinquency was the direct result of the relations internal to the ‘disciplinary’ prison:

[P]rison, apparently ‘failing’, does not miss its target; ...it reaches it, insofar as it gives rise to one particular form of illegality in the midst of others, which it is able to isolate, to place in full light and to organize as a relatively enclosed, but penetrable, milieu. This form is, strictly speaking, delinquency (ibid.: 276-277).

And:

An entirely unforeseen effect which had nothing to do with any kind of strategic ruse on the part of some meta- or trans-historic subject conceiving or willing it. This effect was the constitution of a delinquent milieu very different from the kind of seedbed illegalist practices and individuals found in eighteenth-century society. What happened? The prison operated as a process of filtering, concentrating, professionalizing and circumscribing a criminal milieu (CF: 195-196).

Foucault's argument revolves around the idea that prison inadvertently produced delinquency. When disciplinary discourses were applied (in the form of ‘programmes’ operating through ‘technologies’) to the extra-discursive (i.e. the already existing) world of institutions and individuals they had unexpected effects. This is not a case of delinquency being ‘created’ through discourse, it was not the aim of those discourses to produce delinquency; nor was it a simple redefinition or redesignation of an existing population as delinquent. Foucault’s position is that the particular constitution of the disciplinary programmes and technologies employed in prisons acted with the extra-discursive to produce an entirely new (and unforeseen) population.
Constituting subjects through the prison

Foucault’s own position is that delinquency is ‘fabricated’ by the prison system (DP: e.g. 194, 217, 255-56, 278; see also Palmer and Pearce, 1983). But Foucault faces a problem with the fabrication explanation: it is very similar to the CR-criticised ‘level abstracted view’ (see section 2.2) as it collapses multiple and complex process into one. Foucault is unable to conceptually account for the ontological depth of structures such as prisons because he does not engage with a key element: the extra-discursive. Foucault should be bound by his own theoretical position of nominalism, whereby the very social structures which enable a subject to become an ‘object of knowledge’ also create a new form of that object (Datta, 2007: 280). However, it is clear that the social structures involved in the prison system created delinquency independent from knowledge.

Potentially a much more beneficial position for Foucault is to engage with the concept of ‘constitutively emergent’ entities. One possible route to developing this could be through Foucault’s own conception of power taken alongside CR’s understanding of emergent entities. On its own, Foucault’s understanding of power heavily emphasises its productive capacities as a positive force, ‘creating’ even more than it (negatively) ‘constrains’. However, if emergence is used alongside a conception of the extra-discursive a more detailed argument can be made. Unless one is willing to argue that the delinquents and criminals produced by prisons are ontologically distinct types of human beings (an argument not being made by this thesis), an account must instead explain their difference as originating from the two different forms of prison, the disciplinary and the retributive.

Instead, if the perspective shifts from understanding subjects as autonomous individuals and, instead, to being continuously ‘imbricated’ in power relations and political fields, the subject shifts from being a fully-realised ‘product’ of power relations to
becoming a ‘manifestation’ of power relations. Arguably, there is enough stability to the strongest of these (society wide) power relations that key aspects have a continuous (constitutive) presence. Utilising CR terminology, subjects never quite fully obtain morphostatic status: they continually require the presence of the (strong) social and political relations that constitute them. Importantly, however, the effects of these relations are not determinative—and this is where the emergentist explanation comes fully into operation. The subject is understood as being constituted by the particular power relations in the particular political and social fields in which they are present. But, crucially, subjects are not themselves wholly determined by these relations (restricted, most certainly, but not determined). From a CR perspective this is because subjects are not fully bound by the ‘form’ of their constitutive power relations precisely because they have capacities that are irreducible to their constitutive relations. Subjects are unpredictable because they are socially emergent entities.

Extra-discursive structures
The extra-discursive, meanwhile, intercedes and interrupts the operation of programmes and technologies. Including the physical world (architecture and buildings, natural processes, etc.) and the inter-discursive (other discursive formations or discourses), both can impede the operation of programmes and technologies (Foucault, 1968/1991: 58). The extra-discursive constitutes a major destabilisation process that interferes with political strategies that dominant groups attempt to implement. Within Foucault’s account of technologies and practices—i.e. the ‘means’ of making disciplined subjects—the extra-discursive is explicitly present in the concrete processes of the technologies

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94 See Foucault on ‘domination’ (Subject and Power, 1982b/2003: 143-144).
and practices. However, the extra-discursive also exists externally to technologies and practices and it is this aspect that Foucault *implicitly* adopts.

While the extra-discursive can be a disruptive force, it is not only this. Foucault directly links (*DP*: 279-280; *CF*: 195-196) aspects of the extra-discursive available to the bourgeoisie as the means through which they absorbed delinquency *back into* existing social relations. This was achieved by their strategic implementation of new and revised tactics—a key factor being their control of the dominant *dispositif*. “Delinquency, solidified by a penal system centred upon the prison, thus represents a *diversion of illegality for the illicit circuits of profit and power of the dominant class*” (*DP*: 280; emphasis added). Further:

one finds an immediate re-utilization of this unintended, negative effect within a new strategy which came in some sense to occupy this empty space, or transform the negative into a positive. The delinquent milieu came to be re-utilized for diverse political and economic ends,… This is what I call the strategic completion [remplissment] of the apparatus (*CF*: 196).

A brief summary of Foucault’s position may be helpful here. The dominant class, through their control of the dominant *dispositif*, were able to (re)capture delinquency even though delinquency was an unintended effect of the disciplinary prison. Control of the *dispositif* allowed them to do two things. First, to change the role of the police to become an information gathering—and therefore a ‘disciplinary’—system (*DP*: 213-215, 278, 280). The creation of this new type of criminal population was potentially disastrous; not only did this group suddenly pose a direct challenge to the validity/applicability of disciplinary *savoirs*, but they also challenged the social relations that relied upon those disciplinary relations (i.e. the formation and utilization of a (largely) compliant workforce). Second, to utilise the new delinquent population for their own ends. Control of the *dispositif* enabled delinquents to be used, instead, as strike breakers, informants, *agents*...
provocateurs, smugglers, and as a means of intimidating and controlling workers (DP: 279-280). If this capturing was not possible, then they might otherwise have posed such a challenge to the position held by the bourgeoisie that a new dominant group might have been able to take control (although, it must be said, that this group would not necessarily have been formed from amongst the ‘delinquents’ themselves).

Finding the place of aleatory materialism

While aleatory materialism has nothing to say in regard to the creation of subjectivity, it can, however, be brought in to account for the structural changes leading to the introduction of the disciplinary prison. Of course, Foucault also accounted for this, but aleatory materialism gives additional depth to his somewhat ‘disjointed’ account of history (1984/2003a). From an aleatory materialism perspective the development of the prison certainly includes the factors identified by Foucault—i.e. the different techniques from schools and the army, empirical philosophy (viz. utilitarianism), and techniques in the workplace/division of labour (e.g. QM op. cit.). However, the aleatory materialist would go further than this and argue that the whole process of change was the result of overdetermined, aleatory encounters. The on-going process of change is understood as a series of events each one materialising from a combination of both present structural relations and chance encounters.

However, if this position is left unmodified aleatory materialism comes perilously close to being nothing more than a banal ‘rolling tautology’; i.e. every event that occurred was simply the most likely event given those structural relations. An alternative—and

95 As Datta (2008, Ph.D. thesis: 42) has stated, very few explicitly aleatory materialist accounts of social relations have been undertaken. The only two widely known are Pearce (1998, unpublished) ‘Gifts of Blood’ or Contingent Necessity? An aleatory materialist exploration of the defeat of the Aztec/Mexica by the Conquistadores and Feltes (2001) The New Prince in a New Principality.
even worse—conclusion is that aleatory materialist accounts are in fact nothing more than a revamped version of Hegel’s teleological position; i.e. what happens by ‘chance’ is actually what was ‘meant’ to happen (albeit without the application of Hegel’s component of human rationality). However, these objections can be rejected for the following reason. As an addition to Foucault’s example of the prison, aleatory materialism avoids reducing itself to either a tautology or becoming the fig-leaf for a new teleology by emphasising the process of struggle between different groups and conflict between different social structures.\textsuperscript{96} It is the uncertainty arising from these continuing tensions that lead to aleatory (i.e. chance) outcomes.

This leads to two interesting conclusions. First, where struggle increases in intensity between different groups the certainty of one expected outcome over another is drastically reduced. This is not to say that groups are suddenly evenly matched through the sheer act of confrontation and contestation. But it is to say that even the smallest conflict has the potential for destabilising established power-relations. The ‘Occupy Wall Street’ et al protest movements are a case in point: corporate ‘business-as-usual’ culture, for a while, became increasingly problematic as more scrutiny was placed upon business practices.

Second, as has been outlined above, aleatory materialism quite easily integrates into Foucault’s account of a dispositif. To influence the formation of events, even partially, is a hugely powerful ability. While some events are still ‘chance’ occurrences, aleatory materialism places more emphasis upon why events commonly take particular forms—i.e. manifesting in ways similar and/or favourable to existing structural relations. Aleatory materialism, therefore, argues that existing structures pre-condition the

\textsuperscript{96} This is precisely the same emphasis Foucault uses to counteract the claims that his work is either defeatist or ‘small-c’ conservative (1976/2003a; 1968/1991; 1983/2003).
parameters that surround an event. In a way very similar to Foucault’s genealogical account of events (NGH), it becomes the task of the theorist to identify these conditioning effects—explaining why they successfully operate in some instances and not in others. Then, if something cannot be stopped, it is the action of a dispositif to direct the outcomes and attempt to mitigate as much damage as possible. It might also be possible to reabsorb the event into existing structural relations.  

For Foucault’s account of the prison, then, aleatory materialism offers further theoretical support. The rising economic influence of the bourgeois class lent them additional weight toward promoting a particular world view—viz. that of the rational, sensible, and ‘obvious’ world of disciplined individuals all undertaking their allotted roles in the process of production. For the aleatory materialist, the struggle—and eventual victory—by the new industrial capitalist against the landed aristocracy and the ancien régime political class generated the ability to influence the development of new and emerging social structures. This is not to assure the outcome of these events (hence the emergence of an unexpected and unwanted delinquent class), but it does give the partial capacity to either direct effects or to integrate them.

**Retheorising Campbell’s *Collapse of an Industry***

The retheorising of Foucault’s account of delinquency, whilst an engaging endeavour, is still rather abstract as a means of illustrating the integrated theoretical position. A more

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97 An analogy for the latter two points: the first would be akin to directing a water-hose that you are unable to turn off, at least you can point it in the least damaging direction; the second would be where you are able to link the hose back into the water system and/or be able to collect the water for future use.

98 Compare, for instance, Althusser’s account in *MU* and *UCME* of the (failed) proto-capitalist production operating in Italy and Foucault’s account in the fifth lecture of *Truth and Juridical Forms* of the attempts of factory owners in France to ‘secure’ a compliant workforce. Indeed, much of the third quarter of *HM* is an account of the rise of the workhouses, prison-factories, asylums, and various other attempts to create a disciplined workforce.
contextually-related example that is open to the same retheorisation is John Campbell’s excellent analysis of the decline of the US nuclear industry (USNI), *Collapse of an Industry* (1988). In this work, Campbell utilises a Marxian-Weberian form of political economy as a means of understanding the multitude of political, institutional, and economic circumstances surrounding the formation, development, and decline of the USNI. For Campbell, the interaction between various levels of US state structure, the large engineering and construction companies, and the US commitment to free-market economics produced a particularly difficult environment for the USNI to endure. The particular pre-existing factors Campbell identifies are threefold: (1) the structure of economic interests and funding flows, (2) the structure of the state, and (3) the interaction between businesses (“civil society”) and the state (1988: 22-26). The establishment and growth of the USNI was made difficult because of the particular influences that these factors had upon the industry.

With regard to (1), in 1977 there was huge national diversity in terms of energy utilities and although regionally (i.e. State by State) each utility had a monopoly (i.e. one owner for all of New York State’s coal power stations, etc.), the sheer diversity of these companies “prevented the development of a national monopsony or monopoly” (ibid.: 23). There were also only ever four major, and one minor, reactor construction companies in the US, although there were a multitude of smaller engineering firms specialising in particular aspects of electric power design (e.g. turbines, generators, etc.). Twelve architecture and design firms competed for the design of different power plant components, although a small number of the State utility companies themselves had their own engineers and designers.

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99 Westinghouse, General Electric, Babcock and Wilcox, Combustion Engineering were the big four, with Gulf General Atomic Corporation being the minor player.
Regarding (2), the US government was fragmented had several levels, across all of which the USNI was inspected and held accountable. In addition to this, Campbell argues, all levels of government were open to special interest groups (ibid.: 24) and public interventions were commonplace (e.g. to secure electricity rates after a new nuclear build been approved). While the US Atomic Energy Commission was “at first insular and centralised” (ibid.), after it was broken up in the mid-70s, the responsibility for nuclear policy was split between multiple departments. This enabled both vertical and horizontal obstructionism, particularly in terms of policy implementation.

Finally, for (3) Campbell argues that the US Government took immense efforts to support the USNI through tax breaks, joint finance initiatives, training schemes, etc. While not directly funding capital costs, the schemes removed a large portion of the risk the companies faced if they undertook the projects (ibid.: 25). Interestingly, the only real influence the US Govt. had over the prospect of new nuclear build was through the individual States having Energy Commissioners who could effectively, if not literally, set the price for electricity (ibid.: 25-26).

These three underlying conditions all simultaneously impacted upon four important areas of the nuclear industry: (i) reactor standardisation, (ii) reactor safety, (iii) finance and capital costs, and (iv) high-level radioactive waste (ibid.: 26-28). In terms of (i), Campbell argues the utility and the logic of standardising reactor design was seen early on by all parties concerned with the USNI. However—and this is interestingly similar to the UK coal industry before it was nationalised in the early 1950s (see section 1.2)—the different companies, agencies, and associated groups in the USNI could not agree on any kind of standardised design, hence none was adopted. This meant that “almost every nuclear power station built in the United States was unique” (ibid.: 26).
Turning to (ii), Campbell argues that it was the issue of reactor safety that did most to galvanise wider public opinion against the USNI. The interest of profit over safety was an effective argument that motivated many licensing committee hearings, court cases, electoral referenda, etc. and became the one issue that united all groups concerned about or opposed to nuclear energy. Considering (iii), the capital costs of undertaking new nuclear build became so high that the corresponding rate rise required for profit to be made was similarly open to large increase. This outcome was judged to be unacceptable by many States’ Electricity Commissioners and so rejected. The lack of rate increase discouraged further investment in new nuclear build because the costs could not be successfully recouped. Finally, (iv) is that by the mid-1980s the US had neither facilities for handling, nor long-term storage or disposing of, high-level nuclear waste. This reached a head when in 1983 the US Supreme Court ruled that individual States could single out and refuse new nuclear build until the Federal Govt. had come up with a feasible policy on high-level waste storage. This, effectively, gave States that wanted it a veto over build proposals from companies that included nuclear plants (ibid.: 28).

In his conclusion, Campbell states that the neo-Marxist critique of private-sector driven expansion was confirmed: that short-term profitability took firm precedence over longer-term considerations (ibid.: 184). In an extreme irony, there were actually plans, albeit after the damage was done, that the companies actually began to talk about establishing a single architectural design company that would design everything in order to establish an economy of scale (ibid.: 185). Alongside this, Campbell continues, the profit motive was a considerable—and very reasonable!—objection to the safety of reactor designs (ibid.: 184). Furthermore, the particular form of government institutions allowed institutional crises to develop precisely because there was a fragmented
Institutional structure that enabled anti-nuclear groups to obstruct the process of policy implementation (n.b.: policy design was too heavily centralised for obstruction to be a possibility). Finally, the particular structure of the USNI, with its focus on private companies and on market-driven development, meant that a financial crisis was created because of the ever-increasing demand for profit and quick return on investment amongst the companies (ibid.).

Campbell’s conclusion is that it is only through the prism of political economy that the intersection of the economy, the state, and ‘civil society’ becomes apparent. Campbell argues that the neo-Marxist interest in the relative autonomy of the state was peaking academically at this point, but was not being followed through by a sufficient number of institutional analyses to fill in the gap between abstraction and the concrete. Campbell was attempting to answer the question of what is it specifically that enables (national) states to develop their industries and economies in particular ways? For Campbell, the answer lies in the institutional configuration specific to a particular country.

However, from the argument developed in this thesis so far, this analysis can be broadened much further. By using the integrated theoretical position outlined above, Campbell’s already impressive analysis can be further strengthened beyond just an institutional account (which, admittedly, was always his stated objective). The neo-Marxist approach that he sought to deepen can itself be expanded to accommodate a deeper understanding of the social world.

**Expanding Campbell’s argument**

In *Collapse of an Industry*, Campbell’s argument is purposefully centred around the nexus—the ‘intersection’ as he terms it—of the state, the economic structure of the USNI, and the interplay between the two of them. This tripartite focus also explicitly
emphasised the institutional components, a focus that was meant to provide a concrete institutional analysis for the more theory-centric neo-Marxist and neo-Weberian accounts. The following (albeit brief) critique should not, therefore, be taken as an attack that Campbell’s analysis somehow ‘lacked’ sufficient theory: that was not his aim. However, this thesis does argue that by bringing a suitably adapted theory into Campbell’s analysis, a much stronger case can be made.

Before continuing, two brief points must be made. First, Campbell does include ‘nods’ toward some of the points outlined below. However, they are not developed in any detailed way and the aim of the theory developed here is precisely to make factors such as these much more explicit. The second point may appear axiomatic but it is worth stating explicitly: the ‘object’ of discussion and explanation here is the USNI. Therefore, only details relevant to the USNI will be raised.

*Aleatory circumstances*
To begin with, there are several aleatory instances that Campbell leaves largely unremarked. The first is that the Manhattan Project was based in the US. While the decision was taken partly out of fear that Britain would be overrun by Germany (meaning that any research was liable to capture by the Nazis), and that the continued bombing of British industry by the Germans, as well as the frequent U-Boat attacks in the Atlantic, meant that moving large amounts of materials around the globe and situating them in Britain was not deemed to be a sensible move. Therefore, siting the research for nuclear weapons in the US was an easy case for the US to make: its abundance and global control of raw materials, its light, heavy, and technologically advanced industrial capacity, and its vast economic resources gave the US unparalleled power to insist research was undertaken there. This is also why Canada, an equally geographically ‘safe place’ was
not chosen as the main research site. At the end of the war, the US was in an unparalleled position in terms of its technological and scientific abilities.

The second aleatory point was that during the war, the US quietly undertook a consolidation of practically all existing world uranium stocks, secured title to much future uranium output, and bought-up practically all of the world’s heavy water supply. By doing this, the economic might of the US was used to advance the US’s (anticipated) post-war nuclear interests—as well as to preclude nuclear and economic rivals from gaining a foothold in developing their own technologies. At the end of the war, therefore, the fledgling USNI was in a remarkably strong position from which to develop. It ended up retaining a significant number of the leading nuclear researchers from the Manhattan Project, placing many of them in leading research institutions; it had practically all the raw materials needed for further research; and it had the additional technological advantage of being the country which had developed (the highly complex) nuclear weapons.

A third aleatory factor benefitting the USNI came from being part of the earliest research into (relatively) large reactor designs. The two forms of light water reactor (LWR) that the US developed (the pressurised water reactor (PWR) and the boiling water reactor (BWR)) both came from designs for nuclear submarine engines. It was the US Military who commissioned and oversaw this activity, using private firms for the research and development, allowing them afterwards to utilise the technology for commercial purposes. The USNI simply scaled up the designs (by about a factor of ten) hoping they could be sold to electricity providers. The large technical problems—and not inconsiderable safety issues!—associated with the LWR designs were pushed to the side

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100 This made them operate more quietly so they were more difficult to detect by other submarines.
in favour of rapid commercialisation. (This was the beginning, for the USNI, of what Arthur (1994) terms “path dependency”—once a decision has been taken, others are then taken in line with that initial one.)

A final aleatory factor for the USNI was the size of the US domestic market and the size of the companies undertaking the research, design, and construction. The incredible size of the post-war US economy, the massive revenues generated by the big construction companies, and the huge number of potential consumers of energy, played an important part in maintaining the potential for nuclear energy in the US. The large size of the domestic market (in terms of separate States requiring energy provision) meant that there appeared to be many potential opportunities for selling nuclear power plants. As it turned out, the US market was extremely poor in actually purchasing nuclear plants and this was one of the reasons why the attempt to export nuclear reactors to friendly countries was undertaken feverishly by US companies. Two of the largest buyers of US technology were France and Japan: both countries lacking indigenous natural energy sources.¹⁰¹ It should not go unremarked that Japan, one of the USNI’s biggest customers, was largely a *de facto* US protectorate for many decades after World War II. As such, it was a recipient of US governmental oversight, financial aid, and the US exports upon which to partially spend the aid.

*Events and emergence*

Within Campbell’s account, there are clearly both events and emergent entities in the USNI. The production of large amounts of high-level radioactive waste is an example of an emergent event that necessarily develops from the operation of the industry itself.

¹⁰¹ The Fukushima Dai-Ichi (Fukushima Number One) nuclear power plant consists of six boiling water reactors (BWRs) built in the late 1960s. The design is by General Electric, but the plants themselves were built by both General Electric and Hitachi.
This unavoidable outcome from nuclear fission is the outcome of the fission of uranium atoms. Uranium undergoes natural fission of course, but, importantly, this volume of fission-products it is only possible because of its use in uranium reactors. Natural uranium is neither found in such condensed quantities (at least on the Earth) as it is in nuclear fuel rods, nor is its half-life (its natural rate of fission) anything close to the rate at which it undergoes fission when it is under neutron bombardment in a reactor.

This highlights how the configuration of the USNI itself must lead to the production of high-level nuclear waste. You cannot operate a uranium reactor and not produce fission by-products. Despite the certainty of the production of waste products, the USNI did not accommodate for this high-level waste. Its parameters as a private sector, for-profit structure actively worked against long-term (and likely unprofitable) waste management facilities. As Campbell argues, even the small number of initial waste reprocessing plants that were in operation by private providers could not produce enough profit to make them worthwhile ventures (Campbell, 1988: 113-114, 133-335). The failure to deal with these absolutely certain emergent entities was, ultimately, a huge problem for the USNI. It was this aspect that utilised by the anti-nuclear campaigners, being turned into discourses that emphasised the ambiguity of “profit-before-safety.”

A series of events in the USNI were produced by institutional powers, viz. the authority and powers held by various State energy commissioners. Empowered through legal and institutional frameworks to regulate the price of electricity, the refusal of State energy commissioners to sanction large rate rises to offset the very high capital cost of building new nuclear plants, effectively removed the final stage of the profit cycle. The high cost of nuclear power plants was only viable (in domestic US markets) through a series of economic stages: investment, design, construction, operation, and profit generated from the product (electricity). By setting a limit to the rate of profit able to be
charged by the power plant owners, the energy commissioners denied the possibility of recouping capital build costs quickly enough. Maybe in a different economic system where the offset of prices could be borne by a larger economic structure (e.g. the state), the costs could be offset over a longer time period, potentially making the plants more affordable.\(^\text{102}\)

6.3 Political Economy and the Nuclear Industry
The preceding overview of Campbell’s argument presents an excellent opportunity for this thesis to turn, albeit briefly, to an examination of political economy. Due to the theoretical focus of this thesis—i.e. the critique and development of the theoretical arguments of Critical Realism, Althusser, and Foucault—political economy has not been the primary means of inquiry. However, if even briefly comparing Campbell’s to the overview of the BNI outlined in Chapter 1, it is quickly apparent that the particular concrete form taken by a nuclear industry (NI) is overdetermined by the political and economic institutions configuring that economy.\(^\text{103}\) Precisely because of this, it is necessary to give an outline of the political economic conditions that surround the development of a NI.

There is no single definition of what the object of political economy ‘is’. It has been defined by (Drache and Clement, 1985: 11) as focusing on “social relations… located within the context of the economic, political, and ideological/cultural dimensions on the one hand and within the dimensions of time and space on the other.” This enables a

\(^{102}\) This is close to the French model of state ownership and support for nuclear energy.

\(^{103}\) n.b. This thesis also argues that the inherent mechanisms/powers contained in the material elements used in an NI also overdetermine the form of the industry; regard must be taken of the inherent properties of uranium or plutonium, for instance. This argument is developed further in the following chapter.
move away from beyond what Block (1987) has criticised as being too much of a focus upon individual actors at the expense of political and economic structures. Even the more sophisticated studies of political economy that understood the integration of business and political elites—such as C. Wright Mills’ *Power Elite* (1959) and even parts of Clement’s *The Canadian Corporate Elite* (1975)—put too much emphasis upon social agents *as* independent agents. To counter this, political economy began to explicitly bring in a wider analysis of *how* agents are formed within wider political and economic frameworks—including how they get their particular abilities and powers from this framework. The worker, manager, or executive are not assumed to exist as abstract entities: they are understood to be part of particular social spaces and places (e.g. unions, shareholder meetings, local and national government, etc.), each with a particular historical context specific to them (Zeitlin, 1989: 69).

The discussion here draws upon Mosco’s (2009: 24) contemporary definition of political economy as “the study of the social relations, particularly the power relations, that mutually constitute the production, distribution, and consumption of resources.” This focuses analysis on to three particular types of activity (production, distribution, and consumption) while actively stating that it is the *social relations* surrounding the particular resource in question that are of importance. (This definition also leaves itself open to integration into the argument that the *properties of things* also partially determine the social relations that surround them.) Using this definition also quickly sets boundaries to what is examined in political economy: commodified relations (Mosco, 2009: 143-147; Marx, 1898). For something like a NI, then, one of the key tasks is to alter the

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104 Notable works from this perspective have addressed such subjects as the chemical industry (Pearce & Tombs, 1998), government childcare policy (Michel & Mahon, 2002), state control of territory and geography (Keil & Mahon, 2009), and communication technologies (Mosco, 2009).
predominantly scientific social relations that initially produced a nuclear chain reaction and turn them into a set of commodity relations (Bupp and Derian, 1978: 181). If this can be attained it is at this moment, arguably, that a true nuclear industry is created—i.e. it is not just a military or scientific ‘project’ but now consists of commodity relations based around the production of electricity.\textsuperscript{105}

**Political economy at the national level**

The wider economic, political, and social contexts that existed at the time of the birth of the various national nuclear industries have since changed dramatically. Block (1990; Block and Keller, 2011) argues that there has been a radical shift in the structure of the economies of many Global North/Western countries. Block (1990: 10-11) argues that this change constituted a triple shift: (i) a huge increase in computer automation (so displacing workers from production lines); (ii) large growth in service sector employment; and (iii) the end of the “traditional 1950s life-course” (i.e. the nuclear family consisted of a job for life for the male income earner and unending unpaid domestic duties for the female). Borrowing from Bell (1973/1976), Block argues that contemporary society has moved into a post-industrial form. The difficulties this posed for political economy was how to now account for the changed form of social relations. For the purpose of this thesis, the question has been answered with the definition of political economy adopted above. However, it is worth noting that the change to the (abstract) definition of political economy does not alter the (concrete) changes to social relations—i.e. even though it is possible to now adequately re-engage in political economic research, changes to social relations have had a huge impact upon the structure of society itself.

\textsuperscript{105} n.b. Some countries—e.g. Canada, Sweden, and West Germany—never had an associated military aspect.
To explain the effects of post-industrial society, Block argues (1987: 6-8), meant rejecting the idea of “corporate liberalism” as an explanatory model. Corporate liberalism was already running into difficulty after political economists began to acknowledge that both political and business leaders make decisions that are misguided with respect to their interests and/or deleterious to the ability to continue accumulating capital (for an example of this, see the excellent analysis by Flyvbjerg, 1998). Jessop (1990: 4, 12-13) argues that this kind of reductionism—that elites control everything—is reassuring as a narrative but is hugely misleading as an avenue for social research to take. Instead, research should be focused upon moments of disjoint or disjuncture, such as areas of conflict (e.g. over limits to the working day, the extent of state power/authority) or the ineffectualness of powerful groups. By looking at moments of struggle and turmoil, it is easier to identify and define the background mechanisms/structures in operation that explain how social relations have some level of continuity despite the usual ineffectualness of the elite.

By moving away from surface phenomena as the means of explaining social, political, and economic actions, political economy was able to develop more sophisticated accounts that explained continuity (and change) as due to underlying structures (Jessop, 1990: 8; Block, 1987: 23). For Block (1990), this ushered in what he understands as a new focus on economic sociology. Concentrating on conceptually re-integrating wider social relations back into economic relations, economic sociology focused the attention of researchers back to the social contexts that necessarily must precede economic relations. (In terms of the concepts developed so far in this thesis, Critical Realists would argue this is an attempt to show the mistake of a level-abstracted
With the change in political economy analyses moving away from the corporate liberalism model and beginning, instead, to focus upon moments of disjuncture (i.e. if events went wrong, how come the same relations are still replicated?) this opened up the idea that social relations are *contested*. Focusing on ‘contested relations’ meant that objects, such as the state, became understood as sites of continuous struggle and reformation, not as fully formed and definite entities. As Jessop argues:

> There is never a point when the state is finally built within a given territory and thereafter operates, so to speak, on automatic pilot according to its own definitive, fixed and inevitable laws. Nor, to be somewhat less demanding, is there ever a moment when a single state project becomes so hegemonic that all state managers will simply follow universal rules to define their duties and interests as members of a distinct governing class (1990: 9, emphasis in original).

The importance of this point is that key components in most political economic analysis that are essential to the maintenance of particular social relations—e.g. the state, powerful social groups—are *themselves* unfinished, contested, and conflicted. To understand these components as ‘set’ in their form of relations is to reify them; instead, understanding them as sites of conflict implies that their own reproduction is problematic, meaning that it is open to derailment and/or reorientation. The task facing the researcher, therefore, is to explain how they manage to reproduce at all.

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106 See Chapter 2, section 2.2. This observation might be misunderstood to imply that economics is emergent at a ‘higher’ level than other social relations (for this was, strictly speaking, the context in which ‘level abstraction’ was used in the Critical Realism discussion). However, this is not being implied here. The argument is only that if economics is taken to exist as an independent set of social relations, this is a serious conceptual mistake. While economic activity is *identifiably distinct* from other social relations (which are themselves distinct), it does not necessarily mean economics is *independent* from them.
The strength of political economy lies in its ability to maintain focus upon the three aspects of "production, distribution, and consumption of resources" but also that it is enabled to utilise these wider arguments in regard to the factors surrounding resource use. In other words, political economy examines the various aspects of resources (their production, distribution, and consumption) but that does not necessarily dictate assumptions about the variety of processes, relations, and forms that go into structuring resources. It follows from this that political economy can incorporate additional explanatory accounts regarding wider social relations without suffering detrimental effects to its own theoretical or empirical coherence.

Political economy and the nuclear industry
As should be apparent from the work already undertaken in Chapter 1 and in the discussion above of Campbell’s research, the US and Britain had different structures to their respective nuclear industries. The USNI, as identified by Campbell, was structured solely around private firms designing (albeit working to government specifications), constructing, and operating nuclear plants.107 (For an example of USNI spin-off technologies, see Schrank, 2011.) The BNI, meanwhile, was structured with a strong state presence in both design (the Atomic Energy Authority, the AEA) and provision (the Central Electricity Generating Board, the CEGB), but construction was undertaken by private engineering firms. An aspect that both the USNI and BNI share, however, is the particular division of internal and external costs. In the process of turning nuclear fission into a commodity (Mosco, 2009: 129-133), the various stages that constitute not only the

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107 Morone & Woodhouse (1989: 48) imply that some of the US’s desire for a private sector USNI was because of a partisan commitment to private enterprise as a distinguishing feature vis-à-vis the state controlled USSR.
nuclear fuel cycle but also plant construction are individualised and treated as increasingly individualised components.\textsuperscript{108} As will be argued in more detail in the following chapter, the high costs of nuclear energy have been shown to be largely prohibitive. For the USNI, “turn-key” loss leader plants were built by the big engineering firms for different state utilities. Through a combination of federal government subsidies and the sheer size of the firms themselves (which enabled them to absorb, for a limited time at least, the capital costs of nuclear plant build), the ‘commodity’ of a nuclear reactor was made possible. For the BNI, the design costs were all absorbed by the AEA, with the CEGB then paying for the plant and contracting various engineering firms on a cyclical basis—or “Buggins’ turn,” as it was idiomatically termed in the UK civil service (Walker, 2009; Williams, 1980: 99). (Although it must be said that the CEGB itself did not usually pick the companies, most of the time having the choice foisted upon them by the central government.)

In this way the NI was able to develop with many of the start-up costs offset (both in terms of its establishment as an industry \textit{per se} but also in regard to individual reactors). Similarly, the post-construction costs were similarly externalised. For the USNI there was no plan for what to do with the waste produced by the reactors (see Campbell’s discussion above). As was identified in Chapter 1 and as will be discussed in more detail in the following chapter, the USNI moved away from reprocessing of waste in 1976 out of environmental considerations and fear of potential weapons proliferation. The lack of long-term storage became one of the most controversial issues regarding nuclear energy for the USNI and, at the time of writing, has still not been resolved.

\textsuperscript{108} As mentioned in Chapter 1 the nuclear fuel cycle consists of: uranium ore mining and separation, fuel fabrication and transportation, ‘burn time’ in a reactor core, medium-term storage for spent fuel to cool, then either long-term storage or reprocessing followed by long-term storage (for the unwanted elements).
Similarly, the BNI had no long-term storage plans for spent fuel, although the reactor operators were meant to oversee disposal of their waste material. The CEGB was supposed to maintain a payment stream especially to amass decommissioning costs (i.e. decontamination and demolition of plant sites) as well as toward the long-term storage of spent fuel and other nuclear waste. In the run-up to the privatisation of British electricity producers in 1989, the CEGB was found to have spent much of the money it was supposed to have set aside for decommissioning and that the costs of decommissioning had been estimated at a risibly low level (section 7.2 contains an extensive discussion of these points). Overall, the importance of being able to externalise the costs of both setting-up and cleaning-up a particular NI were hugely important. If all costs had to be internalised, then it is highly doubtful that any NI could operate commercially (i.e. at a profit) at all. Indeed, the withdrawal of subsidies to the USNI has meant that there has been no new nuclear build since the late 1970s (Energy, 2010).

This raises a second interesting point: how does a nuclear industry fare in a post-industrial economy? If Block (1990) and others are correct about the arrival of a post-industrial economic environment, then the nuclear industry might be seen as largely anachronistic; one of the few remaining industries left in an otherwise service sector driven economy. There are factors that would appear to support this interpretation. Although a NI is only, by necessity, involved in a small number of day-to-day industrial processes (such as the transportation and storage of waste and fuel), there are other aspects which are integral to its operation (these include: mining, fuel fabrication, and,

109 This concept of a ‘post-industrial’ economy is not, here, being mistaken for the real-concrete economy. Block et al are not implying that there are no industries remaining in a post-industrial economy/society, only that the majority of the workforce has moved into employment as part of the service sector and that there has been some (medium or large) decline in manufacturing activities.
where applicable, the building of new plants). On this understanding, the NI does indeed appear to have a sizable quota of industrial processes inherent within it. Furthermore, by the very nature of its purpose (to provide electricity) the nuclear plants must be sited relatively near to the population requiring electricity provision; meaning industrial production cannot be moved to a distant area. The interesting aspect of the NI is, therefore, that in a post-industrial society it actively requires the establishment of an entire industrial process. As will be argued in the following chapter, the attempt by the British government to further commodify the BNI solely as an electricity producing entity meant restructuring had to be undertaken to isolate the (already built) nuclear plants from both scientific research and from future decommissioning costs. It would appear that for a NI to ‘successfully’ operate, it must be heavily insulated from (i.e. it must externalise) both capital costs and decommissioning/waste handling costs in order to operate successfully. It is this discussion that partly forms the following chapter.

6.4 Conclusion
This chapter has demonstrated that an integrated theoretical position between CR, Althusser, and Foucault is possible. By using the extra-discursive as a bridging point, the use of events and emergence in CR, Althusser, and Foucault was developed beyond being a mere convenient similarity to an integrated theoretical position. This integrated theory viewed the natural, social, and discursive worlds as stratified and also, to varying degrees, as interdependent upon one another. This was continued by arguing that fallible knowledge is produced about them.

To illustrate this new position two examples from existing literature were reassessed using the integrated theoretical perspective. Foucault’s account of the emergence of the disciplinary prison was strengthened by integrating into Foucault’s
account both CR and aleatory materialism, including a much stronger account of the extra-discursive. Following this, a brief re-examination of Campbell’s account of the demise of the USNI was used to provide a more ‘concrete’ example of the integrated theory. Continuing on from this last analysis, this thesis will now turn to re-examining the British nuclear industry.
**Chapter 7**
**Retheorising the Material and Social Form of the British Nuclear Industry**

**Introduction**
The theoretical arguments developed so far in the thesis have focused on expanding conceptions of both materials and discourse that, together, constitute the social world. Of particular importance was the emphasis upon a non-reductionist materialism that emphasises the importance of social relations but bases them firmly *within and constituted by* wider material relations. From this perspective, the social world cannot be adequately explained just by examining social relations. Of equal importance now are the material objects that *maintain* and/or *constitute* social relations in the first place. The tendencies/powers held within these objects are the forces that give them constitutive effects over social relations, attributes that ‘demand’ the social take regard of them. This means that for complex social objects—i.e. ensembles of various material and discursive relations—there are multiple and continuous tendencies/powers acting upon them at any given time. The British nuclear industry (BNI), therefore, is not merely ‘just another set’ of governmental institutions—albeit ones that deal with hazardous materials. Now the BNI's inherent material and social complexity is clearly distinguishable when viewed through this theoretical lens.

This chapter begins with developing an analysis of the discursive and institutional contexts within which the four main disjunctive events identified in Chapter 1 occurred. Focusing on discourse, a discursive formation of ‘nuclear science’ enabled the generation of quasi-utopian discourses regarding both energy and economics. The
central concepts of future energy and economic success were held by large numbers of nuclear scientists and engineers almost as articles of faith. Their importance only began to dim with the technical and institutional problems that began to manifest in earnest in the late 1960s.

Of equal importance is the intra- and inter-institutional context of the BNI. The various ‘types’ of social structures identified in Chapter 2, section 2.2 (relations, organisations, and institutions) allow for an analysis that takes account of the ‘formal’ institutional structures, the ‘associational’ organisational structures, and the ‘malleable’ relational structures. Subdividing social structures in this way brings to the forefront those particular interrelations that produce and maintain the BNI. The chapter identifies as being of key importance the institutional structure of the Atomic Energy Authority (AEA). The AEA’s form and powers—along with, although to a lesser extent, those of the Central Electricity Generating Board (CEGB)—had an effect of overdetermining huge swathes of the BNI. However, the influence that the AEA directly and indirectly wielded suffered a severe set-back by the failure of key discourses (those of energy and economics), which the AEA was in the vanguard of promoting. In 1971, the rupture of British Nuclear Fuels Ltd. (BNFL) separating from the AEA not only drastically reduced the AEA’s powers but, in effect, created a BNI that is easier to understand as consisting of two separate commercial ventures: the existing energy-focused BNI (the eBNI) but now also a reprocessing-focused BNI (the rBNI).

The chapter concludes with an expansion of the theoretical analysis to account for the conditions that produced the discursive and institutional relations themselves. By identifying both the aleatory events that occurred and the discursive, material and institutional structures that they impacted upon, the fragmented structure of the BNI is explainable. By the year 2000 (the cut-off point for this thesis), the BNI as a whole was
quite firmly a commercial failure. The only industrial/commercial ‘success’ was generated from the reactors that formed the eBNI. However, even this, it is argued, was only possible by the successful deployment of a neoliberal dispositif that ‘recaptured’ the eBNI after its failed initial privatisation.

7.1 Discursive and Institutional Contexts
The conclusion to Chapter 1 outlined four key moments that unambiguously established the existence of an industrial nuclear energy. The four events identified were: (1) the decision in 1954 to only partially develop ‘commercial’ nuclear energy; (2) the 1971 decision to separate the reprocessing division of the Atomic Energy Authority into a separate commercial enterprise, BNFL; (3) the period from 1976-78 when an expected world market in plutonium was suddenly, and severely, reduced—right at the moment when some of the most important discourses justifying the BNI came under sustained attack; and (4) the two attempts to privatise of the eBNI.

All four periods can be understood as instances of disjuncture. They are important because they demonstrate visible restructurings of what was often an implicit commercial focus within the BNI. With the immediate demands by the military for plutonium sated with the operation of the early Magnox reactors,110 the BNI began to develop along a largely civil-oriented trajectory. These four disjunctions demonstrate that there was, at the very least, an expectation by government and central BNI institutions such as the AEA that industrial and commercial operations could be achieved. That commercial success was not achieved yet the BNI still maintained such a dominant position within British industry poses the question that this chapter aims to address. Using the theory

110 Weapon design took place at the fully independent, and military linked, Weapons Research Establishment at Aldermaston.
developed in this thesis, explaining the development of the BNI this falls upon the institutions, discourses, and the materiality of the BNI itself.

The following section argues that two particular factors were present: the first, that discourses of utopian energy and utopian economics; and, second, the institutional structure of the BNI. By identifying these wider contextual parameters, it opens up later opportunities for a wider theoretical argument to be made, one that explains the forces behind the generation of both discourses and institutional form.

**Utopian discourses: energy and economics**

*A discourse of energy*

The 1950s contained much optimism regarding the potential for nuclear fission to generate all the energy that society needed. In *Britain's Atomic Factories* a discussion arises regarding the potential for energy release through nuclear fission:

> …if one ounce of matter could be transformed completely into energy it would give about 700 million kilowatt hours of energy—or, put another way, a mere ounce of matter if wholly converted to energy could supply all Great Britain’s electrical energy for nearly five days (Jay, 1954: 90).

Although part of a wider discussion of Einstein’s $E = mc^2$ equation, the implications are quite clear. Unless nuclear science was making an alchemist’s argument—i.e. the fantastical transmutation of one material into another—there would be no reason to make this opaque comment about ‘matter transforming to energy’ unless there was some expectation that matter (or at the very least, uranium) *could* be turned into energy.

Indeed, Pocock (1977: 25) quotes Lord Cherwell, the then head of the Atomic Energy Council (the advisory group and part-precursor to the AEA), as saying: “it is quite likely that our propensity in the coming century may depend on learning how to exploit the energy latent in uranium (1 pound = 1,000 tons of coal).” The expectation among
scientists was that nuclear energy is the source of meeting nearly all of Britain’s future energy needs.\footnote{However, in terms of the actual performance of the Calder Hall reactors, Gowing states that a transference rate of only 25\% was possible due to their design as primarily plutonium producers—i.e. only 25\% of the heat generated by them was captured by the gas to be used to turn the turbines to generate electricity (1974a: 237 fn.). And, of course, it is not possible to get a complete burn-up of the ounce of uranium because of the emergent atom’s fission produces, i.e. they interfere with the fission of subsequent uranium atoms.}

As Wynne (2009) stated, there was immense “symbolic power” attributed to the BNI.

When the Queen went to open Calder Hall reactor at Sellafield, there was a big supplement in the Financial Times on the ‘Atomic Age’: 50 pages of supplement, you know, like an advert. And [in] there was an image of a nuclear power station—all pristine and clean and all that usual kind of thing—glowing with all the free electricity that is going to come from it. And [in the image] it is stuck up there, in the sky, here’s the surface of the earth down here. So the immediate imagery is of “here is nuclear technology, nuclear power, nuclear expertise, sat up-above the mere world of earthlings;” and there’s a halo around it!... which is the glow of this electricity and this glow of magic [inaudible] (ibid.).

Of course, as Foucault argued, discourse equates neither semantics nor semiology (Foucault, 1978/2003a; 1967/1998; although discourses can be about semiotics, see: Foucault, 1975/1995: 94-103). However, through symbolic instances like the one mentioned by Wynne, it is possible to begin to extrapolate aspects of the wider discursive relations—i.e. the rules of formation (AK: 30), to use Foucault’s term—that enable images like this to be generated in the first place. Part of these rules of formation is arguably that nuclear physics and nuclear engineering was an experimental science that was turned into an industry: it was allowed almost free rein due to, as MacKerron (2009) suggests,

[A]n enormous debt that World War II politicians felt they owed to the nuclear science community for having been involved in the Manhattan Project and
shortening the war by dropping bombs on Japan. And giving the West significant leverage in the emerging Cold War with the Soviet Union, as it then was.

It would appear, therefore, that the autonomy given to the (emerging) BNI was partly due to the—not entirely undeserved—awe with which that nuclear technology was held. At this early point in the development of the BNI, the quasi-utopianism was still undiluted by (significant) real-world setbacks. Indeed, as the MacKerron quote (ibid.) illustrated, the abilities of the Manhattan Project scientists to produce such a theoretically and technologically complicated piece of equipment as the nuclear bomb, coupled with the fact that the early BNI was able to exist at all given the severely restricted resources and tools it had at its disposal, gave a very high level of confidence to the predictions the engineers and physicists made regarding what might happen in the future.

However, after the first-generation Magnox reactors (designed when resources were limited) had been completed, the second type of reactor, the AGR, did not fare anywhere near as well. The 1971 decision to restructure the AEA appears to have been influenced, in a large part, by the abysmal real-world performance of the AGRs and the corresponding loss of AEA credibility.\(^{112}\) Heavily supported and promoted by the large sections of the AEA (although there was already a sizable minority of AEA members vying for the introduction of the US designed LWR reactors) the terrible performance of the AGR, and its failure to secure any export orders for AGRs, impacted heavily on the trustworthiness of the AEA. The decision to separate BNFL as a proto-commercial entity seems, therefore, more likely to have been a means of attempting to secure some form of economic success through independent management. (It is worth noting, however,

\(^{112}\) It is worth noting that by 1971 the two Dungeness B AGRs—the first two AGRs, commissioned in 1965—had already been under construction for six years and were nowhere close to completion. In the end Dungeness B-1 took just under 17 years to complete, while B-2 took over 20 years to complete (finished in 1982 and 1985 respectively).
that the government remained the single shareholder; this was despite the Conservative
government’s declarations that BNFL would at least be partially open to private
investors.) With the failure of the AGR design, expectations for a commercially oriented
BNI shifted from a (hoped for) world-leading energy industry based upon British
technology to, instead, reprocessing nuclear waste.

At this point by the mid-1970s, the discourses begin to shift from the dual ‘energy’
and ‘economics’ toward a more heavily economics-based justification. As discussed
above, the “plutonium credit” was a discursive construction of staggering economic
impact and was frequently used to justify expenditure-in-the-present as offset against the
‘assured’ recouping of future costs. The demise of British reactor technologies, however,
meant that no costs could be gained back from the expenditure present in the
development of the AGRs. The mutually reinforcing argument of ‘economics supporting
energy’ and ‘energy supporting economics’ was removed once the AGRs had failed as a
design.

Of course, the argument that nuclear fission was a valuable and worthwhile source
of energy had not changed—i.e. uranium still released energy under the neutron
bombardment of a reactor core as it had before the failure of the AGR design. However,
the distinction was now important because the discourse of a British reactor design had
fallen apart. There was no longer such an emphasis towards supporting the BNI.
Whether the reactor was Canadian CANDU or the two types of US LWR designs, there
was no point in supporting a British nuclear industry any more. Energy production could
be (somewhat) more assured with designs from other countries, but in terms of
supporting British design, that was now a non-starter. The discourse of ‘energy success’
had relied too much on an anticipated real-world success that never materialised. To
subvert the old cliché: nuclear talk was not cheap, it was in fact very, very expensive. At this point, all discursive emphasis passes to economic justifications.

A discourse of economics
The discourses for the potential of nuclear energy have been covered above, but this position supported—and provided justification for—a particular set of economic considerations. The BNI was always partially influenced by the possibility of future commercial success, both domestically and internationally. This economic argument (i.e. revenue could be made from exporting British technology) was coupled with the desire for less reliance on oil for fuelling power stations (the “shocks” to world oil prices only accelerated this perspective). Since the early 1950s a future with nuclear energy providing a significant component of Britain’s energy needs had been perceived as desirable.\footnote{As indicated in Chapter 1, there was always a tension between nuclear and the coal mining industry in Britain; and this was nearly always a factor in any consideration regarding nuclear energy.} However, these ‘domestic’ economics were always considered alongside an expectation of export of reactor technologies.\footnote{A brief comparison to France and the US is illuminating here. France (like Japan), has no natural resources for providing energy and so has to import nearly all the materials it needs to produce energy. The French nuclear scheme was therefore seen as a priority in order to make France more energy independent—and the costs that this generated were borne largely by the state. The US, as was discussion at the end of Chapter 6, had a wholly commercial nuclear industry which was supported by the massive size of its largest engineering and construction companies. Without an export market for US technology (to France, Japan, etc.), coupled with the internalised markets formed by the Cold War politics of the West v. the Soviet Bloc, then it is doubtful that even the USNI would have survived as long as it did.} This understanding goes back as far as the beginning of the Canadian/British/US collaboration during World War II. During the Manhattan Project arguments over ownership of future post-war patents caused considerable friction between the different governments, as well as among the different scientists involved (Gowing, 1964: 138). The long-term economic viability of the BNI was
held to largely relate to one (presumed) constant variable and two fluctuating variables. The ‘constant’ was the expected price of plutonium when it would be (eventually) traded worldwide as a fuel. The two fluctuating variables were the world prices of energy (oil, coal, and gas) and the expected future demand for electricity.

In an important argument made against the BNI, (the then) Sir Christopher Hinton challenged the use of the ‘plutonium credit’ as a means of accounting for the cost of nuclear build. In his *Three Banks Review* article (1961), Hinton charted the fluctuating value of the credit which was key to justifying the costs of nuclear build. In 1954 the cost of a unit of electricity generated by nuclear was expected to be around 0.9d. (pence), but with the discount of the plutonium credit, it became a net of 0.6d. However, by 1956 the AEA had reduced the plutonium credit from 0.3d. to 0.1d. (making the net cost of nuclear electricity 0.8d). This was supposedly because of the increase in the amount of uranium made available by the US, which made a continuation of the uranium reactor plants a more attractive option rather than relying on the infant FBR technology. However, Hinton argues, by 1956 the operation of real economics had—despite the plutonium credit—pushed the cost of nuclear up 0.25d./unit (Hinton, 1961: 4). This would bring the net cost of nuclear up to 1.05d./unit (0.8 + 0.25)—a cost of over a penny a unit. Hinton brings in the comparison between later nuclear build (when experience and economies of scale with the Magnox reactors had started to reduce costs) to compare the Sizewell A stations at about 0.58d. or 0.65d., (depending on interest rates) to a comparable coal fired station which would cost something like 0.47d. or 0.5d. (depending on interest rates).

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115 Before decimalisation in 1971, British currency was not based on any uniform multiplied number (as the decimal system is, based around the number ‘10’). Pre-decimalisation, 4 farthings made 1 penny (d.); 12 pennies made 1 shilling (s.), and 20 shillings made 1 pound (£).
It would not be unfair to say that energy forecasting is an inherently difficult and, for the greater part, a largely unbalanced process. Alongside the sheer unpredictability of energy prices, even demand can change reasonably rapidly. The fact that price per kilowatt unit has such a prominent place in the justifications for the BNI makes it all the more surprising. Although the “heyday of energy forecasting was the early 1970s” (MacKerron and Walker, 1986: 15), energy demand forecasting and price forecasting always played an important part in justifications for nuclear power. Although interest groups such as *Friends of the Earth* and *Greenpeace*—the latter to a lesser extent than the former—regularly published well analysed assessments of the costs of nuclear energy (Henney, 1991; Patterson, 2009). Although it seems that these assessments didn’t really reach wider public discourse (Brown, 2008; 2009). As stated in Chapter 1, the most searing indictment came from the ex-Civil Service insider and former nuclear energy champion, Sir Kelvin Spencer (1982), which savaged the economic history (and prospective future) for the BNI. Although as MacKerron (2009) states, ultimately:

The economic argument is still [in 2009] potentially quite powerful. But if you look at the 1980s and the 1990s – well the 1980s were the principal battlefield, after the AGR was approved in the late 1960s – it was the use of economic arguments by opposition groups that proved most effective, and caused most people to be interested. And they were largely vindicated by what the City [of London] then discovered in 1989 when it was asked to take on ownership of the existing [sites]... You know I had this very odd situation in 1989: I had been accused for the previous decade of being terribly pessimistic about nuclear power and nuclear economics. And overnight it actually turned out I had been actually quite optimistic and that I had seriously underestimated the costs! Even though I’d been accused for many years of systematically overestimating, for some dark and deeply unpatriotic reason.

As will be discussed in more detail below, the *privatisation* of the eBNI meant that the economic costs had to be made much clearer than they had previously.

The increasing emphasis on the economic aspect of the BNI gives some indication of the loss of the more utopian expectations for the future of a particularly *British* design...
for the domestic BNI. While commercially the idea of nuclear energy might still be attractive, experience from the performance of the Magnox reactors,\textsuperscript{116} coupled but the very harsh reality of the under-performing AGR, meant that the idea of a BNI consisting of British-designed reactors had been totally extinguished. This is not to say that a commercially oriented BNI was not seen as being possible: the pressure from factions within the AEA for adopting the US PWR model had been consistent from the time of the initial design of the AGR (Burn, 1978; Patterson, 1985; Pocock, 1977; Williams, 1980). In this sense, the goal of having a BNI was unabated; the particular route and form that it would take is the aspect that changed.

During this period the decline of the utopian discourses became more pronounced. The previous ability to create and justify (largely) theoretical and/or predictive discourses had lost the key component: a powerful institutional body in the form of the AEA. Previously existing as both creator, arbiter, and then enactor of nuclear discourses, the very real failure of the AGRs saw the AEA forced into justifying the BNI in terms of \textit{commercial} success, rather than either scientific or engineering success. The economic success of the BNI (either in the form of AGRs or the US PWRs) existed as a possibility even after the demise of the British reactor design. The economic success of an operational BNI doesn’t require British design: now it was the case that economic success was possible—even if was always forever destined to be ‘just over the horizon’.

\textit{The polyvalence of discourse}

Brian Wynne: …Because, of course, nuclear waste has been a big issue all along. Ever since 1976 and the Flowers Report—the Royal Commission—produced that

\textsuperscript{116}Although the Magnox reactors were, it must be said, designed under constricted conditions and were never really expected to perform to a high output.
famous principle about “no new build until we have solved the nuclear waste problem.” And the Report-

Nick Hardy: Do you see that as quite a defining moment? In terms of-, Flowers was also part of the AEA at the time…

BW: Exactly, yeah, yeah. No, Flowers has never been an anti-nuclear guy. Well, I think it was [a defining moment], in the sense that it was one of the insiders speaking like this. And I remember seeing him at a meeting at the Royal Society, a long time later—sometime in the 1990s when, I think, he was rector of Imperial College [London]—but basically he was desperate to make amends with all of his mates in the nuclear industry. They had basically seen him as a traitor.

NH: Really!? BW: Because of what he said. So he was trying to find his way back. He was quite an interesting guy, was Flowers, in that sense. He had his own mind and that's why he came up with that thought. I think it is true that it became an embarrassment to the industry all the long [afterwards] (Wynne, 2009).

A major challenge to the BNI during the design and implementation of the AGR was the increasing clamour of dissenting views. Of course, opposition to nuclear power was nothing new: the Campaign for Nuclear Disarmament (CND) had been active since 1958 (CND, 2008) and while initially supportive of nuclear energy (Hudson, 2009) later included energy alongside its opposition to nuclear weapons. However, important changes occurred to the discursive opposition to the BNI with a distinct change in the form of the critical speaker. In the terms of Foucault’s discursive formation, the oppositional enunciating subject became radically altered due to a change in their specialist position. Previously, oppositional speakers were largely non-specialists and non-technical (even if they rose to the intellectual heights of someone such as Bertrand Russell, a founding member of CND). The change to the position of those attacking the BNI was that they were themselves nuclear scientific specialists and/or ‘government insiders’. The growing public criticism from Lord Christopher Hinton (1961; 1976), Sir Brian Flowers (1976), and Sir Kelvin Spencer (1982), as well as numerous well informed Friends of the Earth and Greenpeace documents, challenged (and arguably changed) the discursive environment within which the BNI was perceived.
A concept used by Foucault is that discourses are “polyvalent” (HS1: 100-102), a term he uses to illustrate that a discourse is never finite or fully determined and can be turned back upon itself—i.e. the intended meanings/power relations become subverted. Even with overarching control over the production of discourses (i.e. a discursively dominant position, in Foucaultian parlance), the linked statements that go into the content of that discourse are not eternally ‘set’. Despite the energy-based and economics-based arguments used to justify the development of the BNI, they were open to refutation by others using the same discursive categories contained within the discourses of ‘economics’ or ‘energy’. Some of these instances are amongst the four key moments of ‘disjuncture’ identified earlier; as such, they identify key points at which it is becomes important for the discursively dominant group, in this instance the BNI, to either marginalise the ‘resistant’ discourse (HS1: 95) or to address it directly in order to refute it. Either way, some form of action is required to re-establish overall control. What makes these instances so important, however, is that the ‘enunciating subject’ (AK: 88-105, esp.94-95) changes from ‘mere’ laypeople to scientifically trained and/or knowledgeable government insiders. As will be argued below, the status of ‘a scientist’ arguing that nuclear energy is problematic has a much greater impact than if argued by a non-scientist.

(It is worth here pre-empting a point to be made at the end this section: it is not the case that the BNI existed or maintained a dominant position solely based upon discourses. The ‘resistant’ discourses discussed below, at best, only ever partially destabilised the dominant discourses. However, by even partially refuting the sequence of statements (AK: 117; Sawyer, 2002: 438; Woodiwiss, 1990: 64) that go into constructing a discourse, the institutional and extra-discursive relations that are present and which enable a discourse to be repaired/maintained become much more apparent.)
Returning to Hinton’s *Three Banks Review* article (1961), his assessment of the BNI and its reactor design choices was initially supportive, arguing that in each developmental area (the UK, the US, and Canada/Scandinavia) the nuclear industry utilised what resources and engineering/technical were already present. However, while it is the case that “reactor design is still only adolescent” there is still too strong a pull toward “the influences to which we were subjected in our early days of reactor design” (Hinton, 1961: 16). And if any country is found to have gained advantages in terms of reactor design, he continues, then those advantages should be sought out as part of a commercial exchange. Hinton’s position is, arguably, a rejection of the idea that the AGR is the ‘only’ route available through which the BNI could (or should) develop.

The authority of Hinton’s position comes from his position as a leading figure in the development of both Britain’s atomic bomb and the subsequent development of reactor technologies. That such an enunciation (Foucault, AK) would come from such a senior figure was certainly problematic for the BNI. As Burn (1978), Patterson (1985), and Welsh (2000) all point out, the AEA already had dissenting groups opposed to the adoption of the AGR as the second-generation reactor for the BNI (there were factions for the PWR, as well as the other British design of the steam-generating heavy water reactor, the SGHWR). However, to have Hinton, at that time head of the CEGB, obliquely arguing against the interests of a British-designed reactor, was quite a blow. From hindsight, it is known that the AGR was finally adopted as a reactor choice, but high-level opposition to it began early on in its design and implementation.

The Royal Commission on Environmental Pollution’s sixth study, *Nuclear Power and the Environment* (RCEP, 1976), ran between 1973 and 1976 and was chaired by Sir
Brian Flowers, Professor of Theoretical Physics, part-time member of the AEA Board (RCEP, 1976: 1) and Rector of Imperial College London (Davis and Smith, 2010). It is fair to say that the report sent shockwaves through the BNI because it gave only marginal and heavily qualified support to the further development of nuclear energy; especially in regard to the still experimental FBR programme. The report outlined the projected future for nuclear energy—including the expected ‘plutonium economy’, the projected widespread use of FBRs, and the potential effects of the waste by-products—and then came to a startling interim-conclusion. It is worth quoting almost in full:

The advantages [of nuclear power]... must certainly be weighed against the fears and the risks attaching to nuclear power, which lead many people to regard its widespread development as a grave and unacceptable menace to the world. Acceptance of this development and these risks in return for the promise of abundant electricity supplies has been called “the Faustian bargain.”[117] It needs to be considered how real these fears are. Certainly if we look at the experience and the present extent of nuclear power in this country it might well appear that in contemplating such fears we are creating unnecessary spectres. We are concerned, however, with the future and the fact that the world is on the threshold of a huge commitment to fission power which, once fully entered into, may be effectively impossible to reverse for a century or more.

We conclude that development of fission power on the scale we have described earlier carries implications and potential risks for society which are too serious to be disregarded on the grounds that they are necessarily speculative and of a kind that we have not hitherto expected to address in decisions on technological development. Decisions should not be taken simply on the basis of technological or economic advantage and the assumed necessity of securing steadily increasing energy supplies. The social and ethical issues involved are real and important, and should be widely appreciated and discussed. ... (RCEP: 85).

The language used in the report is measured but at the same time startling precisely because of the restraint employed.[118] The “grave and unacceptable menace” or the “Faustian bargain” might just be “spectres”, but then again they might not. Indeed, the report argues that these potential risks and implications “are too serious to be

[117] (Weinberg, 1972: 33)
[118] Patterson (1985: 42) termed the report’s language “lucid but magisterial” and that it contained “supporting arguments of impeccable authority.”
disregarded” just because they are “speculative”. The report argued that in 1976 the world is on the cusp of nuclear technological lock-in—i.e. the production of a set of self-reinforcing decisions with regard to fissionable materials, security issues, and production of high-grade waste. This has profound implications for the transportation of dangerous fuels and waste as well as (potentially) severe effects on human health.

The Flowers Report could not be easily dismissed because, as Patterson termed it, the Commission had an “essentially establishment membership” (1985: 42). Precisely because Flowers himself and much of the Commission membership were as far from environmental campaign groups as one could get, the conclusions were given additional discursive weight. However, as Wynne (1982) argues the full implications of the Flowers Report were not immediately apparent. It took some time to sink in that the Report had “crystallised a fundamental shift of perspective that nuclear power and THORP be formally acknowledged as social issues” (ibid.: 83, emphasis added).

Developing Wynne’s account of nuclear energy becoming a social issue, it can be understood as an example of what Foucault would term a “strategic” change (AK: 64-70, esp.64) to the discursive formation of nuclear energy. Avoiding any reference to willfully intentioned actors (i.e. Flowers did not ‘intend’ for this outcome to happen), Foucault’s point is that within discourses new combinations of existing elements can be (re)configured and which then often come into conflict with existing discourses. Alongside this, new concepts can also be imported into a discursive formation through the successful linking of external discursive formations/discourses. There was a pre-existing counter argument to nuclear energy, but it was not able to either impose itself upon the economistic-scientific discourses that had existed within the BNI to that point. By rearticulating a number of these points from within the nuclear discursive formation, the Flowers report imported concepts and made them into what Foucault terms ‘points of
equivalency’ (AK: 65)—i.e. the counter-arguments were articulated using the same concepts and statements found within the nuclear energy discursive formation, and not those found in other discursive formations (e.g. CND and ‘moral’ arguments, or purely environmental concerns).

**The institutions of the British Nuclear Industry**

As Chapter 1 outlined, the BNI was a complex institutional arrangement that was itself situated within a wider inter-institutional web. The BNI (i.e. the largely non-military operation) can be understood to consist of: the AEA (with its myriad of different roles), the Windscale/Sellafield site with its reprocessing centre (later to become the main component of BNFL), various research reactors (including the FBRs at Dounreay), the CEGB-owned Magnox reactor sites, the CEGB owned AGR sites, and, albeit loosely attached, the various British construction firms vying for projects to build the nuclear plants. Before the creation of BNFL, most inter-institutional interaction took place between the AEA and the CEGB. As the sole purchaser of power plants, the CEGB was always deciding between coal, oil, and nuclear plants. In a further twist, many of the Chairmen of the CEGB were ex-Heads of the AEA, giving them a good advantage to compare the different utilities.¹¹⁹

The creation of BNFL, the explicitly commercially-oriented reprocessing facility, is also an important influence on the changing dynamic of institutional interaction. When the AEA was formed in 1954, it had a five-fold role: (i) research and development of new reactor designs; (ii) training personnel from both industry and government in the handling and operation of nuclear technology; (iii) act as advisors to the electricity boards (the

¹¹⁹ In Chapter 1 and above in this Chapter, attention has already drawn attention to Christopher Hinton’s broadside against the BNI and the appalling record of the AGRs.
state bodies) that bought/commissioned new power stations; (iv) procure enough of the essential materials to support the industry (i.e. graphite and uranium); and (v) they were to fabricate fuel for the reactors and to dispose of the waste afterwards (reclaiming the plutonium in the spent fuel rods in the process) (Williams, 1980: 26). This particular constitution had the effect—coupled with the autonomy of the AEA from general governmental oversight—of empowering the AEA to formulate, design, execute, and then assess its own activities.

By the late 1960s it was already clear to everyone except its most ardent supporters that the AGR programme was failing to deliver the expected returns of energy produced, runtimes, and economies of scale. The AEA had frequently assured various governments that the AGRs would be a success but, coupled with the complex interplay of interests between the AEA and the private companies that manufactured the turbines, reactor pressure vessels, nuclear boilers, etc., relations between the government and the AEA were becoming increasingly strained. Demonstrating the decrease in political support held for the AEA, a Green Paper\textsuperscript{120} introduced by a Labour government in 1970 was continued almost unaltered by an incoming Conservative government in 1971. This created BNFL, which had a remit to handle all of the fuel fabrication and fuel disposal needs of the BNI (Williams, 1980: 190). As Burn notes, it was thought that there was scope for the “sale [of] Magnox fuel [to] the Tokai Mura Magnox plant and [BNFL’s] contracts for reprocessing spent Magnox fuel from Japan were presented as a model of export selling” (1978: 106). However, the commercial reality of BNFL did not manifest anything like predictions for its success (see the discussion earlier in Chapter 1, section 1.3).

\textsuperscript{120} A document published by Parliament that indicates the proposed form and route which the Government wishes to take regarding a particular issue.
At various times, both the AEA and the CEGB were in tension with the government of the day. The AEA had the dual (and conflicting) role of reactor designer while at the same time providing impartial advice to ministers deciding on the merits of different reactor choices and for wider nuclear issues (Flood, 1988). The two ministries involved were the Department for Power—later ‘Energy’—and the Department for the Environment. The CEGB had tensions with the government between the different choices it had, at different times, between which type of power plant to build and for what cost. The socio-political aspects of whether to support British miners (with coal-fired plants), British technology (with nuclear plants), or in the early years to exploit the cheapness of oil as fuel sources was always a contentious issue. This is not to say that the CEGB’s relationship with the government was always fraught. Where a similar world outlook existed relations could be very congenial. For instance, Parker (2009) spoke of how the Head of the CEGB, Walter Marshall, “kept the lights on during the miners strike [in the early 1980s] by running the nuclear stations absolutely flat-out and ensuring that there was plenty of coal stockpiled at the coal-fired power stations.”

This complex, contradictory, and at times self-defeating form of institutional activity can appear to be difficult to explain. However, using an account developed by Jessop (1990: 328-330; 2008: 21) this kind of institutional activity can be understood as “structural coupling.” Here, Jessop incorporates two different arguments into one. The first argument is linked to the concept of ‘autopoiesis’; the point when a system becomes (largely) autonomous from external control (Jessop, 1990: 320, 354). The second argument is that two autonomous systems can share a particular environment (such as a particular part of a political and state structure), becoming linked through some development of interdependence (hence the ‘coupling’ aspect). Jessop’s argument can account for two different institutions being in conflict with one another, yet sharing both a
common origin, use of resources, or common operational environment. (This point is developed further below.)

In terms of the institutions being discussed here, structural coupling occurred because even though both institutions (AEA & CEGB) have high levels of autonomy from government in making their institutional decisions, they were both still reliant on two central elements. The first was that both required central-state funding streams with which to support their particular activities; the second was that they were connected to each another through a two-way process: (i) the need to produce and then sell nuclear reactors (the AEA to the CEGB) and (ii) the need to provide electricity to both commercial and domestic consumers (the CEGB acquiring reactors from the AEA). Of course, the CEGB could have decided to buy only coal or oil power stations (gas fuelled stations were not an option until the early 1990s), but the combination of the oil shock price rises, the fluctuating price of coal, and the changing costs of nuclear builds meant that to provide electricity, nuclear builds were ‘always on the table’ as an option.\(^{121}\) Both, therefore, can be understood to be autonomous institutional systems but yet both were structurally coupled to each another.

It is at this point that a more definite distinction can be made between the energy and the reprocessing sections of the BNI. The distinction between the two parts, energy-focused section of the BNI (the eBNI) and the reprocessing-focused section of the BNI (the rBNI), can be clearly seen in this comparison between the AEA and the CEGB. All of the energy producing reactors came under the authority of the CEGB since its formation in 1957 so, in this sense, the energy-producing reactors were always separate.

\(^{121}\) Although as Williams (1982: 117-119, 320-321) and Patterson (1985: 14-16, 110) both argue, the CEGB was not always pleased with the costs of building new nuclear plants and, at times, was deeply skeptical of the ‘independent’ advice it received from its AEA advisors.
and could be termed the eBNI. This is coupled with the reactor design and promotion/sales element of the AEA. The AEA was responsible for designing reactors as well as attempting to market them nationally and internationally. Therefore, while the eBNI does consist of the operational reactors, it also consists of the reactor design and development present within the AEA.

With BNFL's formation in 1971, fuel fabrication and reprocessing became a separate part of the BNI. As stated in Chapter 1 and above here, the anticipated world market for plutonium and the expected requirements from countries seeking to manage their nuclear waste more generally was seen as a lucrative commercial opportunity. It is with the creation of BNFL that the rBNI can be understood to develop into a more concise and developed form. The multiple setbacks, failures, accidents, wilful misinformation to Ministers, and even falsification of product data all relate to the activities of the rBNI. Certainly, the eBNI suffered multiple cost overruns during plant builds, near-accidents with operating reactors, and multiple unexpected difficulties, but most of the high-profile events have been with relation to the rBNI.

7.2 The Material and Social Form the British Nuclear Industry
The preceding argument has maintained that a non-military, commercially oriented form of the BNI is identifiable through four specific disjunctive events. These events took place within a wider set of discursive and institutional influences: the discourses extolled a siren-song of energy and economic prosperity, while the institutions were politically and economically very powerful. This relationship began to falter when the realities of the BNI did not match either the wider discourses or institutional expectations.

However, a concluding examination still remains: to identify the wider material and social forces operating to generate those discursive and institutional structures in the first
place. Using the theoretical account developed in the thesis, four main points will be argued. (1) The inherent attributes of objects necessarily require that social relations take (at least some) account of them. (2) That aleatory events were important in the development of the BNI. (3) That there are identifiable emergent effects of social structures and natural entities. (4) It was only through the operation of a neoliberal dispositif that it was possible to restructure the eBNI ‘as it was’ and turn it into what the eBNI was commercially ‘desired to be’.

(1) The ‘present’ and ‘potential’ attributes of material objects
An important aspect of CR’s explanatory account was that it includes an account of the attributes contained within material objects/things themselves. While Actor Network Theory argued that things gain their properties from the networks that they are (presently) part of, CR argued that things have qualities that are inherent to that particular type of object. In this way, plutonium does have radioactive qualities because it is part of a particular network; for CR, plutonium is radioactive in-and-of-itself. From a CR analysis, therefore, other structures have to respond to the particular properties of plutonium if they are going to be in any kind of proximity to it. In the same way, the BNI was forced to incorporate into its design accommodations to offset, or at the very least constrain, the highly destructive properties of radioactive materials. This is not a deterministic argument, just a realist argument: the attributes held by the materials being used constitute an important aspect of the institutional design of the BNI.

Institutional responses to the properties of radioactive materials can be understood to manifest in two ways: the present and the potential. In the present, radioactive materials contain qualities that, unmitigated, are extremely hazardous to human
health. In order to meet this high level of toxicity and danger, physical structures must be constructed that make the manipulation of plutonium and other radioactive materials possible. Designing physical structures based around the properties of a ‘thing’—especially a dangerous substance—means that many possible decisions become ruled out almost instantaneously. Options are restricted and, unless potentially long-term harmful effects are not counted as being important, contingency systems must be integrated into the design of the physical structures.

Still focusing on the ‘present’, institutions must carefully coordinate the activities of agents contained within their social structure. Not just for the actual safety of those agents, but also for the prevention of catastrophic events that may permanently disrupt the operation of that institution. An example of where this was not met can be seen in the failure of the THORP project (see Chapter 1, section 1.3) where within the first year of operation a breakage in one of the pipes transporting liquidised materials led to a spill of highly radioactive waste that rendered part of the plant permanently inoperable (Heath and Safety Executive, 2005). With highly dangerous materials, it is a factor that must always be taken into account and, as such, cannot simply be put to one side without suffering major consequences.

The institutional design of the BNI, therefore, had to take account of these present properties by incorporating a series of designs for the eBNI that contained both the materials for the fuel and the storage of subsequent waste products. For the rBNI, it was always the case that it had to be brought into existence as a part (albeit at first a small

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122 Interestingly—and in a further example of the utility of Bhaskar’s distinctions between the real, the actual, and the (human experienced) empirical—radioactivity itself is usually not consciously experienced by humans: only its effects become apparent and this, of course, is after damage has already been caused. The ‘silent’ nature of radioactivity is one of its most disturbing characteristics.
part) of the BNI: because the magnesium oxide cladding on the Magnox fuel rods corrodes in water—and water filled cooling ponds were the only way of short-term storing the spent fuel rods—reprocessing spent fuel was always a necessity. For a less dangerous substance than radioactive materials, different institutional designs may well have been possible; but with the particular attributes and powers in the radioactive materials in question, options became severely limited.

However, there are also ‘potentials’ arising from the attributes held by materials. Where these potentials are known or are hypothesised/predicted, institutional structures can (re)form based upon these potentialities. The potential for plutonium to be used in atomic weapons meant that it was a highly important substance. If its material attributes had been different—something like a more powerful version of coal, for argument’s sake, that released its energy over a much longer period of time—then there would have been no requirement for the BNI to be so secretive. If there was no possibility for the hyper-release of energy in the form of a bomb, i.e. there are no “coal powered bombs”, the military would not have been involved and, arguably, radioactive materials would likely have taken on an institutional form of nothing more than another basic fuel. It is precisely the potential for plutonium to be used in weapons that made it so desirable.

Similarly, the process of using uranium as a fuel necessarily makes ‘present’ the ‘potential’ for waste. This is an unavoidable occurrence: the design of nuclear reactors in the BNI is such that highly hazardous waste is certain. This new ‘present’ has two manifestations that must be dealt with. The first is that waste handling and management must be incorporated into the design of the BNI. However, the long-term management of waste has not, so far, been incorporated into the design of the BNI. The technical difficulties of long-term waste storage—of terms of at least 100,000 years for high grade
waste—are huge. The present institutional, political, social, and discursive factors surrounding the BNI are not conducive to a non-conflictual resolution to the matter.

It is both the ‘present’ and the ‘potential’ attributes inherent in the substance of uranium and plutonium that part-created the institutional form of both the military-nuclear facilities and the wider BNI. Whilst the military, government, and corporate/business institutions pre-date the BNI itself, the specific form that the BNI finally took was a product of various existing institutional forms: i.e. the British state created something ‘new’ but in its own image: the AEA (this is discussed in more detail below). However, that new institutional entity, and now the wider BNI, were forced to accommodate the ‘present’ attributes of nuclear materials. In contrast, the BNI is still only treating the ‘potential’ attributes of the materials as hypotheticals when as far back as the 1976 RCEP report the demand was placed upon the BNI to deal with existing waste before embarking on creating even more.

(2) Theorising aleatory events
The altered form of aleatory materialism developed in this thesis offers two particularly fruitful avenues of analysis: prior circumstance and response to events. Keeping in mind the position developed in Chapters 3 and 6 that aleatory materialism is not a simple ‘listing’ of chance events but argues for their continuous interlinkage, the following points can be made.

It is worth mentioning first the international aleatory circumstance that first initialised nuclear research at all. The Frisch-Peierls Memorandum123 (see Chapter 1), was itself a product of scientists fleeing the Nazi occupation of mainland Europe. When

123 The first hypothesis that only a few kilos of uranium was enough to sustain a fissile chain reaction.
all nuclear research was moved to the US, the Manhattan Project was explicitly a military operation. The first development of workable nuclear technology was, therefore, under military control. The structuring of nuclear research, therefore, was initially explicitly in the context of meeting military needs. Nuclear fission was first and foremost a weaponised science, not a civilian science. This might, for instance, go some way to explain the abandonment of research into thorium-based reactors: thorium, being lower on the periodic table, fissions into atomic elements that are unusable in atomic weapons. If nuclear energy was initially developed as a civilian science, it is not unreasonable to hypothesise that the form nuclear reactors might have take could have been very different than they actually did.

Secondly, the decisions made in 1953 regarding reactor design and operation are very important from an aleatory materialist perspective and are indicative of the ‘prior circumstances’ factors. Marx’s oft-quoted throwaway line from the Brumaire neatly summarises this position: “[Humans] make their own history, but not spontaneously, under conditions they have chosen for themselves; rather [it is] on terms immediately existing, given and handed down to them” (Marx, 1852/1983: 287). The first decision is that the proto-BNI had to ‘make do’ with the resources and materials that it had at its disposal during the post-war years until just after the 1952 Monte Bello bomb detonation. The development of a particularly British nuclear science took place within the context of post-war scarcity and, as Hinton (1961) alluded to, utilised only the materials that were available. This was alongside often starving other industries of much needed supplies (Gowing, 1974a: 224; 1974b: 39-45). The relatively meagre supplies that the proto-BNI had access to were therefore the ones chosen to initialise the industry: graphite for the reactor moderator, natural uranium (U-238) for fuel, and gases to be used as coolants (transferring the heat of the core to drive the electricity generating turbines).
Even after the event of exploding the Monte Bello bomb, it was not until 1958 (Arnold, 1992) that the US formally signed an agreement with Britain to mutually supply each other with resources and expertise (Walker, 1999: 7).\textsuperscript{124} However, while the US aid and cooperation was certainly important, it was a drop in the ocean compared to what was required to generate an entire industry. There was also deep scepticism in the BNI over the safety of the various LWR designs used by the US, so—along with lacking similar materials to even produce the US design for a British industry—they would most likely have rejected a US-designed reactor anyway (Gowing, 1974b: 381-382).

A third aleatory event was the military’s demand in 1953 that the reactors produce large quantities of plutonium. This, arguably, stymied the initial development of energy-producing reactors. Energy production is greatly reduced in plutonium producing reactors due to both the lower level of heat that these reactors generate and are required to sustain,\textsuperscript{125} coupled with the constant shut-down and start-up needed in order to extract the old and insert the new fuel rods (Gowing, 1974b; Patterson, 1985; 1986; Pocock, 1977). The military’s requirements also meant that there was a corresponding setback to the knowledge in physics and engineering regarding the complexities of running a large reactor (as the Magnox reactor designs certainly were) for long periods of time and at higher temperatures. As all countries experienced when attempting to ‘scale-up’ their smaller experimental reactor designs, the change in size radically changes the physics of their components (Patterson, 2009).

Aleatory events would also include two unexpected blocks (one scientific, the other political) to a central objective of the BNI: the use of and the international trade in

\textsuperscript{124} Walker (ibid.) lists these as being: plutonium from Britain to the US, and highly enriched uranium and tritium from the US to Britain.

\textsuperscript{125} Plutonium production requires a shorter length of time before it becomes diluted with other fission products making it more difficult to extract during reprocessing.
plutonium as a source of fuel. The AEA was focused toward establishing the FBR as a viable technology for the eBNI. If this could be achieved then while uranium stocks lasted the reactors would not only be generating energy they would be generating increasing amounts of future fuel for themselves. The worldwide failure to secure a workable FBR technology (Cochran et al., 2010), meant that this central component of the AEA and eBNI reactor programme was destroyed. Instead of the ‘thermal’ Magnox and AGRs only being ‘stop-gap’ technologies to generate income from domestic and foreign sales before the FBR technology took-off, the thermals instead became the only component of the eBNI. Despite operating FBRs continuously from 1959 to 1994 at a combined $8 billion cost\(^{126}\) (ibid.: 2, 6), successful operation above 20% of capacity was never achieved. When the Conservative government of Margaret Thatcher made the decision in 1979 to finally reject AGR technologies for a PWR at Sizewell B in Suffolk, it was the final nail in the coffin for the BNI reactor technologies. Funding for the FBR programme was drastically reduced in 1988 and ceased by 1994 (ibid: 87).

The dual decision in 1977 by US President Carter to first reject the idea of a plutonium economy and, second, that the US would cease to reprocess its own nuclear waste was well before the failure of the FBR design. While being unable to enforce a non-voluntary ban on reprocessing, the US’s control over much of the western world’s nuclear fuel, via its contractual and legal hold over much of the spent fuel used in Western Europe and in partner countries such as Japan, was considerable. President Carter’s ban, therefore, had a significant effect upon the possible reprocessing markets. It also produced a \textit{de facto} removal of a large part of the rationale for ‘needing’ to reprocess plutonium in the first place. Even if FBR technology suddenly found success,

\(^{126}\) US dollars at 2007 value.
there was now a greatly reduced market in order to trade in it (barring its use, of course, for weapons and this was outlawed under the Non-Proliferation Treaty). Of course, if the FBR suddenly became a viable design there was the possibility that the pressure to trade in this fuel could force a US reassessment of its position, but this possibility was (obviously) linked to the viability of the FBR technology itself.

Overall, these aleatory events were hugely significant for the development of the BNI. At least in the early stages for the proto-BNI, the aleatory events were military related. The Manhattan Project was the culmination of a military focus toward the destructive capacities of nuclear fission. This focus continued from the end of the war until the Monte Bello detonation, but after this the expected shift toward overriding civil energy concerns was realigned to meet military needs for plutonium production. The failure of the FBR programme is another aleatory circumstance. Based upon the preceding successes in developing reactor technologies (the Magnox and the AGRs), the FBR’s troubles were always interpreted as mere impediments rather than as serious setbacks. The final recognition that FBR technology was not viable brought to a close probably the biggest single discursive/extra-discursive conflict that the BNI experienced. For instance, the issues of nuclear waste, financing of nuclear plants, and the expected success of the AGRs was always much more openly contested than the FBR programme. The FBR programme was always the ‘coming energy utopia’; recognition of its failure was a huge blow to the BNI.

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127 There is, of course, the possibility for its use in MOX (mixed-oxide) made from mixing plutonium and uranium. However the market for MOX is (even at the end of 2011) very small and it requires alterations to be made to reactors in order for it to be used as fuel.
(3) Reassessing institutional structures
Taking the broader, more theoretically abstract view of the institutions of the BNI, two points quickly become clear. The first is that the particular powers of social structures in their most concrete form (as defined in Chapter 2) solidified into institutions. As institutions social structures have a definite, organised, and formalised arrangement that produces emergent power and properties. The effects that emanate from both the actual—as well as, at times, the potential—exercise of these powers creates a certain inter-institutional environment. The second point is that the form of the BNI can be argued to have developed in response to the particular attributes of the ‘things’ that it dealt with. The attributes of and the powers held by radioactive materials, the technological precision required to create the specific ‘conjuncture’ necessary for a nuclear chain-reaction to take place, and the geographic necessities for the operation of nuclear plants (e.g. the availability of water for cooling systems, etc.), all directly contribute to the particular form of the BNI. Before discussing this, however, attention will turn to the first point, that of institutional power(s).

In Chapter 2, section 2.2, and Chapter 6, section 6.1, the argument was made that institutions have both a physical presence—manifested in the directed and constrained conduct that agents who are part of that institution undertake—but institutions also have an additional potential presence. This potential presence is contained in the latent powers that are available to that institution. Developing from the Bhaskar/Benton exchange discussed in Chapter 2, this thesis argued that (almost) all social action takes place within wider socio-structural contexts that partially shape and determine the actions possible within them. Structurally, this consists in the development or curtailment of possible actions (as well as the discourses possible within them); subjectively, structures place both conscious and unconscious limits on the potential actions for the subjects.
contained within them. “You can’t pay rent to yourself,” was Sayer’s (1992: 119) similar example: if social structures were either voluntary or contained only the powers innate contained in those subjects within them, then it should be possible to “self-define” the payment of rent not to a landlord, but to yourself. The impossibility of paying rent to yourself (except in particular legal circumstances that only, in fact, further prove the rule), demonstrates that social structures do have a presence and power that, even when largely unexercised, constrain the subjects within them. Importantly, these active or inactive powers contained within a particular structure also impact upon subjects not contained with them: the inability to pay a sufficient rate of rent, for instance, acts to keep many people from being able to become tenants in the first place. The ability of social structures to affect others external to their particular set of relations is important, for it means that decisions taken in the terms of one particular institutional and organisational context have impacts outside of that initial context.

In terms of the formation and development of the BNI, this theoretical perspective gives additional emphasis to the institutional powers of the AEA. The five-fold remit given to the AEA (see Williams, 1980: 26, also listed above) was very large, as was its high level of autonomy from government. Its control over research and development, procurement and production of essential materials (including fuel), as well as its training and advisory roles, meant that the AEA was unparalleled in its ability to affect large swathes of British nuclear policy. Similarly, because the AEA was, by and large, the only specialist organisation with the knowledge to assess its own work, it lacked any significant additional institutional oversight. During the time leading up to the Monte Bello bomb and then in the early years of the BNI (i.e. the 1950s until the early 1960s), the AEA (and its precursor) were highly focused on the needs of the military and on
developing the Magnox reactors. These (comparatively) clear goals meant that the AEA had a reasonably focused set of targets to meet.

However, after the Magnox programme was successfully established and decisions were being made with regard to the reactor choice for the second nuclear build (which was ultimately the AGRs), the AEA was suddenly less constrained than it had previously been: the military was largely satisfied and the Magnox reactors were performing as expected. The choice of the AGR was always the likely one to be made—in order to support British industry and design, etc.—but the totally underwhelming performance of the AGR was surprising given the backing it had received from the AEA.

The institutional structure of the AEA was emergent (in the CR sense) from the wider British state structure. While the initial race to develop a nuclear weapon had already been achieved by 1954 (when the AEA was brought into being) successful management and development of Britain’s nuclear assets was seen as vital to the interests of Britain as a military and commercial nuclear power. The AEA’s organisational structure can be understood, in CR terms, to be a ‘partially-closed system’. The AEA was part of the government’s shroud of official secrecy and, coupled with its largely autonomous decision making abilities, gave the AEA a freedom for action that most other government agencies did not have. Adding to the secrecy and the high level of autonomy, the AEA practically had an assured funding stream through the Parliamentary vote. Once funding was assured for that particular financial year, the AEA was able to operate almost free from any meaningful supervision. As the AEA itself also provided the expert advisors to the different government ministers/departments there would appear to be, at the very least, a conflict of interest. Indeed, even where disagreements existed within the AEA (e.g. regarding the choice of either AGR or PWR technology, Walter Marshall being a case in point) there is no evidence that the AEA
advisor ever told the government *not* to take nuclear over coal plants. (It was this point, arguably, that gave the Flowers Report such impact: it was almost unheard of to have an AEA ‘insider’ like Sir Brian Flowers challenge key aspects of the ‘nuclear future’ discourse.)

Revisiting, for a moment, a point in Benton’s critique of Bhaskar (see Chapter 2, section 2.2), social structures may exhibit *coercive* powers over individuals. Sayer’s argument regarding rent (see above) demonstrated this: without wishing to be included within an institution and its operation, both individuals and other social structures may find themselves ‘coerced’ into types of conduct (both witting and unwitting) that are in fact direct *responses to* the first institution’s powers. The AEA is an example of this type of institutional power: its central role in the development of the BNI meant that the effects emanating from its myriad decisions concerning policy, research, and partnerships created a wider environment that was almost entirely *reactive to* the AEA (as opposed to proactive). The AEA clearly had control over its internal relations and had formalised these relations into set structures. Its authority and control (to pre-empt an argument by Jones, below) over nuclear materials meant that it was able to further restrict—i.e. to partially determine—the possible actions of other institutions and individuals.

**(4) The neoliberal nuclear: capturing energy and expelling science**
The staggering scientific achievement of the Manhattan Project had multiple effects. The first was obviously the terrifying new ability for those possessing the technology to annihilate thousands of people in only a few seconds, as well as maiming many tens of thousands more—all with just one bomb blast. Another effect was to open up the study and manipulation of elements at the atomic and sub-atomic levels. Yet another effect, and the subject of discussion below, was the elevation of nuclear science to a position of
central importance for government. The establishment of the AEA gave British nuclear research a very high level of independence. Forty-five years later (from 1954 to 1989), the style and form of this research had to be ‘recaptured’ by a new form of managerial government that sought to enact neoliberal discourse and to install free-market principles. To undertake this transformation required a ‘recapturing of a rogue science’. The initial failure, but then subsequent success, in reorientating the eBNI through privatisation, can be understood to be an effect of a dispositif, acting to reconcile the incongruence of a failed scientific discourse (that of ‘successful’ British nuclear science) couple with the failure of neoliberal economics.

This chapter has already covered the important status Britain gave to its nuclear scientists after the end of World War II. Not only were their intellectual endeavours valorised, but their future role in developing the ‘next generation’ of both weapons and energy supply was seen as the key factor in the race to enable Britain to develop a globally advantageous position. The British programme to develop an atomic bomb took place over a period of seven years from 1945 to 1952 (ending with the detonation of the Monte Bello bomb). The single-minded focus of all groups (governmental, industrial, and scientific) upon the goal of developing nuclear capabilities has been remarked upon in multiple sources (Brown, 2009; Burke, 2009; MacKerron, 2009; Patterson, 2009; Walker, 2009; Wynne, 2009; Arnold, 1992; Gowing, 1974a; Pocock, 1977; Williams, 1980). After the success of the bomb project and the design of the Magnox reactors, the establishment of the AEA in 1954 solidified into an institutional form the high degree of autonomy that the various individual scientific researchers (all academics by background) had maintained during their research work at Harwell, Risley, Springfields, etc.
However, this autonomy—the ‘autopoiesis’ (Jessop, 1990)—coupled with the (official) secrecy surrounding the AEA meant that it was largely excluded from external (re)view and control. This is not to suggest that ‘only had their been more oversight’ the glaring lack of judgement in supporting the AGR would not have been made. Rather, it is to suggest that the independence of the AEA was a key factor in generating what Wynne (1982) called “emotional investment” in the discourses of scientific progress and industrial success, producing a self-reinforcing tunnel vision to ‘prove the discourse’ right. The institutional setting of the AEA was consequently quite a large factor in encouraging this development.

The modified CR position used in this thesis is that social structures at the level of ‘institutions’ are the structured conduct of the agents that constitute them; yet these structures also have emergent powers and properties, some of which can rest in a dormant—inactive—state awaiting activation. In this context, when faced with external criticism of its activities the AEA was able to utilise its independence precisely to avoid the scrutiny of other organisations. This autonomy was also able to be utilised to support the discourses—regarding the strength and likely success of the AGR and FBR technologies—long after they had become seriously disputed by other groups. The establishment of BNFL, seen in this light, was an attempt to partially neuter the excesses of the AEA. The failure of the AGRs both domestically and internationally—and the long-anticipated but never manifesting performance of the FBR—was seriously detrimental to the credibility of the AEA.

However, governmental support for the eBNI in the form of operating nuclear reactors was still very strong. The decision to privatisate the UK electricity providers was part of a wider neo-liberal economic discourse (Pearce & Tombs, 1997: 3-33; Foucault, 1979/2008), but the expectation was that nuclear power plants operated as ultra-efficient
sites of electricity production. However, when the Conservative government had decided to privatise the UK’s electricity production, the CEGB’s accounts were opened up to inspection by investors. What the investors found was that the CEGB had been operating the reactors largely at a loss, maintaining them through cross-subsidisation. Taylor (2007: 41-42) quotes a former CEGB senior official as saying: the purpose of the CEGB was to “provide cheap electricity to British industry and to do this they usually ran at a loss.” At the eleventh hour, just before privatisation was due to take place, the nuclear power stations were withdrawn, leaving just the coal plants. This was a huge setback to both neoliberalism’s discourse of privatisation and to the discourse that nuclear energy was an economic and energy marvel.

It is at this time, at the point of discursive and economic failure, that the actions of the dispositif can be understood to be used to recapture the nuclear industry. As was outlined in Chapters 3, 5 and 6, a dispositif operates as a “management system” (Hardy, 2011: 75) that works to reconcile not only the problems inherent in the particular social complexity that is ‘society’ itself, but also works to attempt to nullify, reintegrate, or remove elements contradictory to the dominant group. In Foucaultian and Althusserian terms, it is unquestionable that the dominant social form is bourgeois (Foucault) or capitalist (Althusser). Jessop makes a subtler distinction in defining a society, and state, as capitalist or not depending on whether the outcome of their activity supports or excludes the reclamation of capital and surplus value—in this way Jessop firmly describes the British state as capitalist (1990: 338-369).

However, through the privatisation process the BNI was suddenly opened up to a much stronger and more destructive discursive formation regarding capitalist accumulation. The reality of the eBNI as operated by the CEGB, was antithetical to the neoliberal discursive formation because the BNI was not performing in a way that
maximised either energy production or economic performance. This was not simply a conflict between two competing discourses: where one extolled the (nuclear-)scientific discourse of inquiry, research, and experimentation (alongside the CEGB’s remit of supporting British industry), the other profit maximisation and the private ownership and control of resources. The ‘structural coupling’ (Jessop, 1990: 325) of the BNI—both to the state and to a particular form of economic practice (i.e. cross-subsidisation)—was more heavily integrated than the neoliberal discursive formation had expected.

It is at this point that the (Althusserian) dispositive and the (Foucaultian) dispositif can be understood to come into operation. From the Althusserian perspective, there were plainly contradictory elements of (a) the existing discursive articulation of what the BNI should presently be (i.e. a successful branch of British science and engineering), (b) the neoliberal expectation of what the BNI could become, and (c) the real circumstances of what the BNI actually was: three oppositional positions, two discursive and one real. The power of the dispositive was that it enabled social agents enacting the neoliberal discourse to redefine, restructure, and ultimately replace the previous form of the BNI with a vastly different configuration. Through the period of quasi-state control, the eBNI was sharply reconfigured (Chesshire, 1991; 1992; MacKerron and Sadnicki, 1995; Taylor, 2007) and made singly profit-oriented (Parker, 2009). When the eBNI was finally privatised in 1996 (as British Electric) the ‘heritage’ liability for decommissioning (MacKerron and Sadnicki, 2000) had been stripped away and firmly rehoused in (what was left of) the AEA and in BNFL; the research aspects of the reactors had been exorcised; and limits had been put upon private liability in case of a catastrophic accident. From an Althusserian perspective, the operation of the dispositive was to

\[128\] The period from 1989 to 1995 where the control of the reactors was divided into Nuclear Electric and Scottish Electric.
reconcile the contradictory positions inherent in the eBNI. The successful reconciliation and then alteration of these contradictory positions meant that structural change was made possible.

The Foucaultian perspective would understand the *dispositif* to operate partly in the same way. However, because Foucault developed his concept of *dispositif* further than Althusser, the Foucaultian account broadens to include the recapture—or, at least, the subordination and restriction—of nuclear scientific discourse into the boundaries of a neoliberal discursive formation. The success of the *dispositif* is evident through its successful privatisation of profit and public ownership of liability. For instance, the same quasi-state control could have been enacted to maximise profitability of the energy producing BNI and then it could have been retained within public ownership. The semi-private management style (which was most certainly highly divisive within the BNI itself) demonstrates that state ownership and profit maximisation are *not* antithetical to one another.

The concept of corporate-capitalist ownership is broken down by Jones’ (1982: 9, 92-97) into a tripartite nexus consisting of control, possession, and title; this distinction highlights very well the change to the eBNI. The eBNI was originally wholly owned by the British state (in the form of the AEA and the CEGB) and the initial privatisation proposal would have transferred all profit and liability (minus the money that was expected to have been set aside by the CEGB for future decommissioning) into private ownership. However, the shock to the neoliberal schema was that the nuclear power plants had liabilities that far exceeded anything that was expected and did not operate at a constant profit (e.g. see the discussions in: Chesshire, 1991; MacKerron and Sadnicki, 1995; MacKerron, 1995). The last minute extrication of the nuclear plants from privatisation was potentially a major failure, but the *dispositif* enabled the neoliberal
position to regain dominance by separating the reactors from large sections of their liabilities. From 1989 to 1995, the state took control of the reactors and oriented them singly toward profit maximisation. When full privatisation occurred in 1996, the private sector took ownership (control, possession, and title) to the working reactors only; the state, meanwhile, took title only for the future decommissioning costs. This careful separation of profit from liability meant that the private sector was more than willing to take ownership of the eBNI.

**Conclusion**

This chapter began with an analysis of two factors, discourse and institutional structure, that had widespread significance for both aleatory events and wider extra-discursive elements that impacted the BNI. The two commercial forms of the BNI were continually heavily intertwined but it was possible to distinguish two separate sections of the BNI: the commercial reactors that produced electricity were termed the “energy-BNI” (eBNI), and the reprocessing and extraction of elements from waste were termed the “reprocessing-BNI” (rBNI). The beginnings of the failure of the eBNI—with the disastrous domestic performance of the AGR along with its failure to generate export markets—was later compounded by the continuous failures of the FBR to operate successfully. The FBR failure was important because, excluding the early military demand for plutonium, the FBR operated as the main ‘linkage’ between the eBNI and the rBNI. If the FBR could be made to function successfully then the extraction of plutonium by the rBNI for use in the eBNI would become a virtuous-circle—i.e. the one supporting the other for cumulative and increasing benefits. However, this possible future never materialised.

Finally, a major rupture in the eBNI was identified during the process of its move from state ownership to private ownership. The chapter argued that was through the
operation of the dominant neoliberal dispositif that the eBNI was altered to make it ready for private ownership. The problem in facing privatisation was the huge discrepancy between the neoliberal discourse of what eBNI was supposed to consist of (i.e. scientific excellence and economic success, marred and restrained by poor public sector management) and what it actually consisted of (cross-subsidisation in the name of providing a basic and cheap domestic source of electricity). Requiring emergency withdrawal from privatisation, the eBNI was then carefully prepared under neoliberal state guidance to strip away liabilities associated with decommissioning and to then orient its focus toward nothing else but profit generation. Securing liabilities firmly in the public sector made the eBNI a desirable technology for private investors to acquire—and it was duly then sold to private investors.

By using the theoretically integrated position developed in this thesis, the complexity between discursive and extra-discursive fields can be more easily understood and critically assessed. Through highlighting the effects that events and emergence have upon and within discursive, social, and natural systems the importance of discontinuity in the progress of systems can be observed. Similarly, by using a refined understanding of CR's conception of institutions, the adaptability and resilience of autopoietic institutions to outside influences was shown to be highly important in the development of social complexities such as the BNI.
Conclusion

Overview
The various arguments employed over the course of this thesis have encompassed a wide range of theoretical perspectives. Unpicking the strands of the incredibly rich tapestries found in the theoretical arguments of Critical Realism, Althusser, and Foucault meant that much subsequent work was necessary to draw them back together again—especially if the thesis was to avoid the charge of syncretism. Critiques employed against all three perspectives developed the strengths of each one but did not gloss over lacunae and weaknesses. Instead, they were removed through internal retheorisation or external integration. The result was an ontological and epistemological account that highlighted the importance of both the material and the social in accounting for change.

The critiqued version of CR developed in this thesis was used to underpin and integrate different aspects of the work of both Althusser and Foucault. CR has very little original “applied” content, for it is meant to operate as a background theory to aid wider theoretical (re)organisation. However, the arguments and the content in the work of Althusser and Foucault provided detailed and informed examples of investigations into concrete historical circumstance. For Althusser, his ontological account of non-deterministic materialism was given additional weight through the CR argument for structural causality and structural (re)formation. However, Althusser’s account of agency or of discursive change was largely silent. By integrating Foucault’s arguments for the form and operation of discourse, Althusser’s account was greatly strengthened, enabling him to engage with discursive as well as social/material structures. For Foucault, the depth of his epistemological accounts of social and discursive change were shown to
lack an adequately theorised counterweight: the extra-discursive. Through the procedural and causal arguments advanced through CR, and by integrating Althusser’s arguments for material change, Foucault’s work was moved toward a greater balance between the discursive and the extra-discursive.

Chapter 1 began by outlining the complex material and social history of the British nuclear industry (BNI). After giving a brief but detailed sketch of key moments in the BNI, four were argued to demonstrate the existence of a British nuclear industry rather than just a subsidiary project to the atomic weapons programme. The four examples were: (1) the decision to refocus planned energy producing reactors toward plutonium production; (2) the shearing off of fuel fabrication and spent fuel/waste handling from the Atomic Energy Authority (AEA) into the new body British Nuclear Fuels Ltd. (BNFL); (3) the setbacks suffered by the failure of the planned worldwide ‘plutonium economy’, the continued failure of the fast breeder reactor project, and the discursive disruptions of the Royal Commission on Environmental Pollution (RECP, 1976); and (4) the privatisation of electricity production starting in the late 1980s and completed in the mid-1990s.

To develop an adequate account of these particular material and social forces, a new theoretical perspective was argued to be required. Chapter 2 began developing the foundation for this integrated theoretical perspective by outlining the core elements of CR and then developing a sympathetic critique. Argued to be of key importance in CR was the emphasis on processes of natural and social change. This process account of change highlighted the importance of the CR concepts of events and emergence: events signified moments of conjuncture between different elements, emergence signified the production of entities or powers that were not present before the particular structural arrangement of elements. By critiquing CR in this way, an account was produced that reformulated the account of social structure. Building on Elder-Vass’ account of
emergent institutional powers (Elder-Vass, 2.2), the critiqued position argued that, in a way similar to natural structures, some social structures could create effects upon both the social agents contained within them as well as upon others who come into contact with them (e.g. a state welfare recipient). The result of the discussion was to lay open the path toward investigating the work of both Althusser and Foucault.

Chapter 3 developed Althusser's intriguing account of material social change. His argument for aleatory materialism, 'chance' materialism, was first outlined and then expanded. By using an account of social structures that incorporates a dual emphasis upon both immanent effects and as (largely) independent of wilful human activity, social change takes on a new 'immediacy'. By furthering Marx's exorcism of Hegel's teleological deus ex machina, Althusser creates an account of social structural change that makes explicit the importance of structural form as they are in the present. To aid explaining this further, the chapter discussion turned to Althusser's examination of Machiavelli and the latter's analysis of 'enduring conjunctures'. Here, the effects of social structural forms were argued to be of prime importance because they constitute immanent effects upon the social structure of which they are part. Four points were argued to follow from this: (1) there is an ontological immanence to the world; (2) social structures continually require 'renewal'; (3) theoretical inquiry is itself an essential component to producing adequate knowledge of the world; and (4) that theory can be an aid to struggle.

Chapters 4 and 5 focused first on outlining Foucault’s two main epistemological modes of inquiry (archaeology and genealogy) and then outlining how his concepts of events and emergence could be expanded to include an expanded version of the extra-discursive. Foucault's archaeological and genealogical methodologies were examined to expand their dual potentials: for the former, the ability to define and account for
discursive structures; for the later, the important articulation of disjunctive social change. The argument presented in the thesis was that Foucault’s change was not an attempt to expel ‘failure’—instead the adoption of genealogy was an invigoration that he was unable (or unwilling) to link to its predecessor. However, by examining the two concepts of events and emergence, and expanding the concept of the extra-discursive, a deeper and more integrated account of both the two methods but also of Foucault’s work as a whole can be made.

Having begun to lay the groundwork through the arguments presented in chapters 2, 3, 4, and 5, Chapter 6 began to outline exactly how CR, Althusser, and Foucault could be integrated together. By using the extra-discursive as a bridging point between the three arguments, CR becomes established as an ‘underlabourer’ (Bhaskar 1975/1978; Benton, 2007) to both Althusser and Foucault. This enables a stratification between the discursive/material. This in turn allowed ‘background’ relations, such as Althusser’s aleatory structural change and part of Foucault’s discursive formations, to be understood as providing the conditions within which ‘foreground’ relations occur, such as social agency and the production of discourses. The social and natural world can, importantly, continue to be seen to be immanent yet only a partial experience level of this world is actually possible. This, of course, echoes CR’s account of the empirical world constituting only a subset of the actual which is, itself, only a subset of the real. Reflective social action only constitutes a fraction of the social forces/powers that are in force at any given moment. By using CR, Althusser, and Foucault to deepen ontological accounts of the social and natural world, as well as the epistemological constructs used to produce knowledge(s), the full spectrum of forces, powers, and tendencies that constitute any given moment of social interaction become more fully apparent.
The final main chapter re-examined the ‘common sense’ object of the BNI. Instead of being a mishmash of political, social, and economic forces, when retheorised as a material and discursive object, the form and development of the BNI was understood largely not to be the effects of human agents, but largely a response to the constraints placed upon social relations by the very nature of the material objects themselves. The apparent mundanity of this argument masks a complexity lying beneath it. The chapter argued that by recognising the constitutive effects of the forces found in material relations and in (some) social structures, social and social-material interaction can be understood as being produced within the boundaries of these forces. However, it was argued that this was not a form of ‘reductionist’ materialism. Importantly, within these relations there remains the potential for reflexivity: social agents are not cultural automatons in this account. The BNI, therefore, was argued to consist of familiar institutional structures (government agencies, industrial forms, etc.) and so appear relatively common-place. However, the inherent qualities of the materials that the BNI necessarily engages with—radionuclides, highly toxic waste, the potential for large scale destruction (from a bomb), etc.—means that the BNI is highly atypical and it requires a particular structural form if management of the particular elements is to be maintained. The chapter concluded with an analysis that demonstrated the importance of what an integrated theoretical position, such as the one developed in this thesis, can bring to theoretical investigations.

Limitations to the thesis
This thesis has two main limitations. The first is in regard to the empirical object analysed by the integrated theory: the BNI. As primarily a theoretical thesis, the scope for empirical research was necessarily restricted by both the space available in the thesis
itself and the aims of the wider project. The decision to focus the ‘application’ of the theory on the BNI, therefore, was based upon both the BNI’s inherent interest as a highly complex social object but also because the reduced space available meant that to explore more than one example was not possible. In a manner similar to the earlier quote from Helm (2003: 15), a continuous and detailed empirical account was not necessary to explain the broader theoretical arc of the arguments developed here. If space had enabled more than one empirical object to be examined, then possibly a comparison between the BNI and the chemical industry could well have been a fruitful route to take. However, as it stands the thesis was only able to focus upon one particular empirical example.

The second limitation was the necessity to focus upon only a certain range of the concepts contained in the three theories. The focus on events, emergence, and the extra-discursive was necessitated because a full comparison between every element contained in each of the three theories would have been impossible given the space available. The thesis, as it stands, covers the three concepts because they were argued to offer the greatest chance of success in bridging the three different positions. Other comparisons could have been made, for instance, between Althusser’s argument for ‘ideology’ and the ‘interpellation of subjects’ and Foucault’s argument for the construction of subjects through ‘subjectivisation’—a hugely interesting argument per se—but this would have taken the thesis away from the more socio-structural emphasis and analysis that was the main focus of the thesis. However, further work could indeed be done along this line, but that is for another time and another project.
Contributions to social theory and to sociology

The first contribution links to the second limitation listed above. There is the old joke that generalisations from particulars should never be made—and even then, ‘never’ should only be undertaken cautiously and with the appropriate caveats. While no specific claims of empirical universality were made in this thesis, theoretically the abstracted argument of discursive/extra-discursive interaction is more widely applicable. The theoretical arguments and concepts developed here are not specific to the context of nuclear energy. While each empirical instance, of course, can give ‘particular’ concepts to a theory, if the empirical is later removed then those particular concepts remain—as do any abstract generalisations produced from them. In this way, the abstract theoretical argument can be applied to any empirical situation; although, of course, how it relates to the content of any situation would require interpretative work on behalf of the researcher. (But this would be no different to, for example, Foucault’s argument that discourse is constructed by ‘statements’ meaning a researcher has to then actively identify the statements contained in any particular discourse.)

It should be noted this is not a claim to ‘theoretical omnipotence’! Merely that, according to this integrated theory, all social interactions necessarily take place with wider social and natural relations. From friends meeting in the school playground, to fly-fishing for trout, to economic crises, all imply a particular set of discursive and extra-discursive relations that constitute the possibility for that situation to arise in the first place. From the school that requires compulsory attendance in which (potential) friends first meet, to the equipment, skill, ability to travel to the river, as well as the free time to fish for trout, to the economic relations that enable commercial conduct to operate in such a way so as to create a crisis, all of these situations can only arise because of those wider contexts.
A second contribution is more directly to Foucault’s *oeuvre*. By developing Foucault’s argument regarding the extra-discursive (Hardy, 2011), his theory is able to incorporate a more rounded articulation of the social and the material world. Previously this was a lacuna in his work, tying him to a position that was, arguably, too discursive in its orientation. By expanding what material focus Foucault *did* have with regard to the extra-discursive—and then developing this through CR—his work can take on a much stronger form. Similarly, Althusser’s work on aleatory change is strengthened by the addition of a CR account. Although published posthumously from notes (so criticism should not be levelled too strongly toward Althusser), aleatory materialism ‘as is’ requires theoretical labour to bring it into an operationalised form. The work in this thesis has gone some of the way towards developing such an account but much work still remains. However, the value of expanding Althusser’s non-deterministic account of material change would be well worth it.

Finally, as a result of the research conducted for this thesis there would appear to be a lacuna in the history of the BNI: the continued failure to develop the FBR. During the analysis conducted in the thesis, it became clear that underpinning the continuous use and development of the ‘thermal’ reactors was the idea that ‘soon to arrive’ would be the ‘fast’ reactor. This almost messianic belief—at least in the beginning—that the technology was only just around the corner, formed a central tenet that underscored the viability of both reprocessing and the future plutonium economy. Whilst important to the argument made in this thesis only in terms of its discursive underpinning and, as Patterson (2009) termed it, the economic effect of it being “the single biggest black hole for money in the nuclear industry” (Patterson, 2009), the fast breeder reactor (FBR) programme deserves further analysis in itself. Within the BNI and nuclear industry more...
widely, never was such hope placed upon an aleatory event that was strived for so hard, yet so devastatingly failed to occur.

Conclusion
This thesis has argued that there exists a highly productive relationship between Critical Realism, Althusser, and Foucault. Critical Realism provides a means of theorising social change that escapes both Althusser’s ‘hollow’ materialism (i.e. structures with very little content) and Foucault’s version of the ‘epistemic fallacy’ (i.e. discursive knowledge becomes a totalising theoretical position). By introducing an ontologically deeper and epistemologically richer conceptualisation of both discourse and the material world, the thesis generated a much stronger account of how both factors continually resonate with each other. Critical Realism itself also benefits, however, as it is opened up to both the depth of the accounts presented in Foucault’s work and to Althusser’s non-reductionist arguments for material and structural change. I agree with Day’s (2007: 117, 138) assessment that “the way in which ‘postmodernist’ theory is handled by most realists leaves much to be desired;” and to overcome this means rejecting the idea that insights generated from post-structuralism “cannot be of use to those whose interests incline more toward what are commonly known as the natural and social sciences.” This thesis has attempted the few steps towards overcoming this dichotomy but the remainder of that road remains largely fresh, yet to be walked.
Appendix

A Lay-outline of Nuclear Fission and Nuclear Reactors

Nuclear fission

Atoms consist of, in varying quantities, three components: protons, electrons, and neutrons.\(^\text{129}\) Protons are positively charged, electrons negatively charged, and neutrons have no charge at all. An atom’s nucleus—its central mass—is the combination of its protons and neutrons; circling at (a relatively) huge distance from the nucleus are an atom’s electrons.\(^\text{130}\) Both protons and neutrons are types of ‘baryons’, meaning that they are each constructed of three sub-atomic quark particles. The force that binds the quarks together to form each type of baryon, the ‘strong force’, also binds the protons and the neutrons together to form the nucleus of an atom—albeit at a much weaker level and is hence called the ‘residual strong force’. While the residual strong force is enough to maintain the stability of most atomic nuclei, it is the offsetting by the neutrons of the mutually repellent forces of the protons that is ultimately the key to atomic stability. In stable atoms, such as carbon or lead, there is a balance between the positive charge of the protons and the neutral force of the neutrons. In unstable atoms, such as uranium-235, there are not enough neutrons to offset the repellent forces of the protons so, consequently, the nucleus is under constant risk of breaking apart. This ratio of neutrons to protons (N:P) can only vary within particular parameters: in the smaller atoms, such as

\(^{129}\) The following account relies heavily on Patterson (1986), Williams (1980), and Scurlock (2007).

\(^{130}\) An atom’s nucleus measures about \(10^{-12} (0.000,000,000,001\text{cm})\), while the electrons ‘orbit’ at \(10^{-8} (0.000,000,01\text{cm})\) (Gowing, 1964: 20).
carbon or oxygen, the ratio is at or very near 1:1; in the heavier atoms, the ratio is closer to 1.5:1 (Scurlock, 2007: 10).

Atoms are distinguished by the particular number of protons that are present in them. It is this consistency in the exact number of protons that determines an atom’s **atomic number**, as well as being used to define the **chemical element** of the atom (uranium, helium, lead, etc.). But there are variations **within** atomic chemical elements.

For instance, atoms may have the same number of protons (and hence have the same atomic number) but they have differing numbers of neutrons in them, hence they have a different **atomic weight**; each ‘type’ or ‘variation’ of an atom in this way is called an **isotope**. For example, atoms that have the common feature of containing 92 protons (and therefore have the atomic number 92) are labelled uranium atoms; uranium usually forms in one of two isotopes (atomic weights): U-238 and U-235. In U-238, the nucleus contains 92 protons and 146 neutrons (238 ‘nuclei’ in total) and is unstable. In the case of U-235, the atom is even more unstable as it has 92 protons but only 143 neutrons.

An unstable atom can break apart in one of two ways: spontaneous fission or under neutron bombardment. When under neutron bombardment, the impact of an additional neutron (a ‘piece’ of another atom that has broken apart) destabilises the nucleus of an atom to such an extent that that the forces holding it together weaken enough for it to break apart—releasing, in the process, the energy that previously held it together. Unless under extreme circumstances (e.g. the molten core of a star) only a certain number of atoms are susceptible to fission. It would be incorrect to think that fission ‘erases’ an atom. Instead the atom splits apart into atoms with smaller atomic

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131 Isotopes are a means of identifying chemically identical atoms that nonetheless have physical differences. A crude analogy can be made to types of car: several cars are all manufactured by the same company—they are all Ford’s, for instance—but the physical characteristics of each model are different—one is a hybrid, one is a hatchback, one is a saloon, etc.
numbers as well as possibly releasing stray neutrons. Uranium-235, for example, breaks apart in this way including the ejection of two neutrons. It is these ‘spare’ neutrons that are used in a reactor to instigate a chain reaction: each single fission creating two ‘spare’ neutrons that fission other atoms which then fission further atoms and so create a sequence of: 1, 2, 4, 8, 16, 32, 64, etc.

As Patterson (1986: 14-16) outlines, as one atom breaks down into atoms of smaller and smaller atomic numbers and atomic weights, they emit a variety of types of radioactivity. A U-235 atom (usually) breaks down into two smaller atoms and two or three neutrons (these neutrons, in close proximity to other uranium atoms collide with them, so causing fission). One of the smaller atoms contains 38 protons and 52 neutrons (strontium-90 which is highly radioactive), the second has 54 protons and 89 neutrons (xenon-143, an inert gas). Strontium-90, having a very large number of neutrons to protons, emits β-radiation (beta radiation, which is the expulsion of an electron) and one of its neutrons turns into a proton. It then becomes yttrium-90, another β-radiation emitter, which then finally turns into zirconium-90, which is stable (Patterson, 1986: 16).  

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**Radiation and radioactivity**

Radiation is the term used to denote particular forms of energy and/or tiny mass (i.e. mass as a volume, not as a number) ejections from atoms that have undergone either

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132 The atomic weight of x-90 does not change because electrons—which are expelled in β-radiation—are not counted towards an atom’s atomic weight. Strontium-90, yttrium-90, and zirconium-90 all have the same atomic weight (the same sum of protons and neutrons) but the ratio changes, i.e. they just have different atomic numbers (number of protons) as well as fewer electrons.
nuclear fission or radioactive decay. Radioactivity comes in four forms: alpha ($\alpha$), beta ($\beta$) (both of which are physical particles), gamma ($\gamma$) (which is a ray), and neutron.

Alpha radiation ($\alpha$-radiation) is the ejection of two protons and two neutrons in the form of a helium atom. The (relatively) heavy helium $\alpha$-particles are analogous to cannon balls: thudding into surfaces, they cause large surface damage by ploughing a furrow, but have very little penetration. A single sheet of paper is effective in stopping $\alpha$-particles.

Beta radiation ($\beta$-radiation) is either the emission of an electron (due to a neutron having changed into a proton and so changing the charge of the atom), or the emission of a positron (equivalent to an electron, put positively charged, as a proton changes into a neutron). As $\beta$-particles are smaller and lighter than $\alpha$-particles, they are less likely to hit other atoms as they pass through matter, meaning they are capable of penetrating much further into other objects. They can be stopped by a thin layer of metal foil.

Gamma radiation ($\gamma$-radiation) is the result of energy (in the form of a photon, a highly charged particle of light) being expelled by an atom. Containing huge amounts of energy and containing no positive or negative charge, $\gamma$-radiation is only effectively stopped by concrete shielding at least two-metres thick.

Neutron radiation is the ejection of a single neutron from an atom. Like $\gamma$-radiation, neutrons are neither positively or negatively charged, meaning they can also travel great distances and are also only effectively stopped by concrete shielding two-metres thick. Neutrons are also relatively heavy and do a great deal of damage in a similar way to $\alpha$-radiation—but being more powerful they penetrate much further, ploughing a furrow through an object not just on its surface like $\alpha$-radiation.
Since 1975, radiation has been measured in ‘becquerels’ (Bq): 1 Bq is equivalent to one nucleus decay per second. The older ‘curie’ (Ci) measurement, which was allowed to be used alongside the becquerels for a number of years, was equivalent to the emissions from one gram of radium per second—which stands at 37,000,000,000 emissions per second. As that is a very high level of radioactivity, there are several sub-units of curies: millicurie (37,000,000), microcurie (37,000), nanocurie (37), and picocurie (0.037).

Radioisotopes (i.e. radioactive atoms) are impossible to predict as to when a particular atom will decay (i.e. spontaneously emit radiation, so changing its atomic structure and form), but there is a high level of predictability to the average rate of decay: this is the ‘half-life’ of an isotope. Strontium-90 has a half-life of 28 years, meaning that in any given quantity, at the 28 year mark half of the S-90 will have changed into another atoms. The remaining Strontium-90 will halve again in another 28 years, and then again, and so on.

All four types of radiation (α-radiation, β-radiation, γ-radiation, and neutron) can be harmful to biological tissue, with high levels of radiation able to destroy a cell. More likely, however, is that damage will be done to the genetic structure of a cell or to the ability of the cell to successfully or accurately sub-divide. Part of this damage is that all four forms of radiation are ionising. Ionising radiation is where the particle being emitted is positively or negatively charged—as is the case with α-particles (which is positively charged and so attracts electrons) and β-particles (which can be either negatively or positively charged). γ-radiation and neutrons are indirectly ionising because they travel so fast and have so much energy they can disrupt the electrons around other atoms and alter them.
If ionising radiation come into contact with biological tissue, the effects can be pronounced. There are now two standard means of measuring the effect of radioactivity upon humans: the *gray* (Gy) measures radiation absorbed, and the *sievert* (Sv) which measures the damage sustained from the radiation. Grays and sieverts are based on the previous *rad* (radiation absorbed dose) and *rem* (roentgen equivalent man, named after Wilhelm Roentgen who discovered the x-ray). One Gy is equal to 100 rad, and one Sv is equal to 100 rem. To give an example of severity of dose, 400 rad (4Gy) kills half the human adults exposed to it. The difference between rads/grays and rems/sieverts is that the latter also allow for the severity of the type of radiation to be taken into account. With this distinction, \( \beta \)-radiation and \( \gamma \)-radiation radiation have equivalents in 1Gy equals 1Sv; but for the much more damaging \( \alpha \)-radiation and neutron-radiation, 1Gy equals about 20Sv due to their much more destructive effects on tissue (Patterson, 1986: 17).

**Nuclear reactors**

One of the most concise lay-guides to the process of nuclear fission is found in Patterson (1986); (see also Williams, 1980: 339-342). Taking the example of a reactor designed to produce electricity (as opposed to one engaged purely in plutonium production), the nuclear reaction takes the place of coal, gas, wind, etc. as the means by which turbines are moved, so generating electricity. A reactor is constructed of the following broad components: fuel, moderator, coolant, and control rods.

*Fuel:* most reactors in the world are designed to run on uranium. Some were designed to run on plutonium, and there are a very small number that run on mixed-oxide (MOX) fuel—normally a reprocessed product made from spent fuel cartridges—and there are plans, in India, to build and run a series of thorium fuel reactors. Uranium reactors usually operate with 'enriched' uranium fuel. Enriching uranium is a process where the
fissile (i.e. the most unstable) uranium-235 is extracted from the much more common, and more stable, uranium-238. The naturally occurring ratio of U-235 to U-238 is 1:139, meaning U-235 is approximately only 0.7% of any quantity of naturally occurring uranium (Williams, 1980: 339; Pocock, 1977: 6). For enough U-235 to be present and so sustain a chain reaction, it is first extracted from U-238, collected in enough quantity, and then added back in to U-238 in order to constitute between 3-5% (depending on the requirements of the reactor design) of the total volume of the (now) ‘enriched’ uranium.

Moderator: keeping with the example of U-235 as the fissionable atom in question, when U-235 breaks apart (during fission) it both ‘fragments’ into smaller and lighter atomic elements and it also loses a certain number of its neutrons. The newly created ‘daughter product’ atoms retain most of the neutrons from the original U-235 atom but, importantly, they do not retain all of them: because they contain smaller numbers of protons (a lower ‘atomic number’), they need fewer neutrons to hold them together. The ‘excess’ neutrons are now ‘free’ to collide with other U-235 atoms, destabilising the balance of forces in the nucleus, and so cause them to break apart as well. Because each uranium atom releases two neutrons, not only is a chain-reaction initiated (one atom affects a second, the second affects a third, etc.) but also the reaction increases in magnitude (one atom affects two, two affect four, four affect eight, etc.) so long as there enough fissionable atoms to break apart.

However, the speed at which neutrons are expelled during fission is incredibly fast. This means that the neutron might either pass between the other fissionable atoms (not striking them at all) or it might be deflected off of the atom even if it does strike it. In order to slow the speed of the neutron down a moderator is used to impede it, so making

\[ \text{\textsuperscript{133}That an atom, upon breaking apart, causes some of its neutrons to strike other fissile atoms, so disrupting them and causing them to breaking them apart as well.} \]
it much more likely that it will both strike, and then break-apart, another fissionable atom. Reactors that use moderators are called *thermal* reactors; the (very) small number of reactors that do not use a moderator are called *fast* reactors (Williams, 1980: 340).

*Coolant:* as the name implies, coolants are either gasses or liquids that are used to absorb the heat generated during the fission process. Depending on the technological design—and, therefore, the ‘requirements’ being made of the reactor—the volume of heat being generated can vary, but it easily be several hundred kilowatts of heat per litre (volume) of the reactor core (Patterson, 1986: 23-24). Even at much lower temperatures than these, it becomes essential to remove the heat or otherwise the reactor core would melt and catch fire. In an energy (i.e. electricity) producing reactor, the coolant is channelled around the reactor core (so absorbing large quantities of heat) and then used to transfer this heat-energy to run turbines to generate electricity. Different types of coolants can be used (liquids or gasses) and they can be in either open or closed circuits (e.g. river water or the open air for the former, or pressurized water (heavy or light) or carbon dioxide gas for the latter) (ibid.).

*Control rods:* in order to sustain the chain reaction in a reactor’s core, both the moderator and the coolant must have the characteristic of low neutron absorption (if they were not, they would absorb many of the neutrons instead of allowing the neutrons to collide with the fissile atoms). As neither of them ‘control’ the intensity of the reaction (indeed, the moderator increases its likelihood by slowing down the neutrons and the coolant stops the process from melting the core altogether), it is through neutron

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134 The 1979 film *The China Syndrome* is fictionally based upon such a hypothesis. Depicting the cover-up of a near catastrophic accident at a US nuclear power plant, the film depicts how a series of cascading problems combine to produce a reactor core meltdown. Twelve days after the film was released—and to public derision from many scientists and commentators as being scaremongering—the nuclear reactor at Three Mile Island suffered an almost exact replica of the near-meltdown depicted in the film.
absorbent materials that the chain reaction is kept under control. Control rods are raised or lowered into the reactor core (from their neutron resistant housings) in order to either absorb, and so reduce, or allow, and so increase, neutron radiation occurring from the fuel rods in the reactor core. The usual material for a control rod is boron, as this is highly neutron absorbent.

Output: the role of a reactor’s coolant is (usually) two-fold: (i) it is needed to remove a percentage of the heat generated by nuclear fission, and (ii) if the reactor it is meant to produce electricity, the coolant transfers this heat to operate turbines. The level of heat produced by the reactor is measured in megawatts thermal (MWt); similarly the electricity generated from the turbines is measured in megawatts electric (MWe). A megawatt being a million watts. The transfer of energy from MWt to MWe is termed a reactor’s efficiency. As Patterson states “a satisfactory… [standard] is to assume that, for a given power reactor, the output in MWe is between one quarter and one third of the output in MWt” (1986: 26; for an earlier ratio see Gowing, 1974b: 237 fn.).

Non-nuclear Energy Provision in Britain
As this chapter has already emphasised, the development of British nuclear energy did not take place in a context of industrial isolation. While this context is important and will be outlined below, this section refrains from delving too far into great detail because, to partly adopt Helm’s position, it “is well beyond the remit of this [thesis]; nor is it necessary for the development of the main arguments” (2003: 15). In this way the industrial context can be outlined, without moving too far into an analysis of energy policy more generally. The argument being made in this thesis is precisely that once begun, the British nuclear industry became an object largely independent of the ‘usual’ constraints faced by the other energy industries.
Pre-existing the development of nuclear fission as an energy source—and present throughout its development—were three alternative energy industries of coal, oil, and gas. Coal was by far the largest and, until the early 1990s, the de facto dominant means of British energy provision. It was the unexpected revolution in gas turbine technology, along with the deregulation of the British gas supply market, and the unique circumstances arising from the imminent privatisation of electricity production, that sparked the “dash for gas” in the early 1990s. The huge construction programme of gas-fired power stations effectively sealed the fate of coal as the prime means of generating electricity. Oil, while popular in the 1950s and 1960s as a source of cheap—and relatively clean—fuel for power stations became decidedly less popular after the two ‘oil shocks’ of 1973-4 and 1979. The founding and development of nuclear energy, therefore, took place within a complex economic, political, and social field of competition, interaction, and change between these other three energy technologies.

**Coal**
The history of British coal mining is a long one. To the observer in 2012, coal fires both domestic fireplaces or large electricity generating power stations. What is frequently forgotten, however, is that before the use of natural gas (which is liquified, processed, and then piped as gas into domestic homes) it was coal that was used to produce gas, which was then pressurised into containers and sold as fuel. Coal was also the fuel that fired the boilers of Britain’s steam railway system. It was not until the early 1970s that

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135 The Oil Producing and Exporting Countries (OPEC) raised the price of crude oil in response to the US and Western countries support for Israel during the October 1973 ‘Yom Kippur War’; prices maintained a high level until March 1974. The increase was from around $5 a barrel to around $15 a barrel. In 1979 the Iranian Revolution sparked another spike in oil price, from about $15 a barrel to almost $40 a barrel.
coal faced real competition (from nuclear) as an energy source, and not until the 1990s did gas start to drastically eat into coal's energy dominance.

The expansion of coal mining in Britain is linked to the Industrial Revolution when coal became the fuel of choice for heating the boilers on steam-powered machinery. One of the earliest recorded national outputs for coal is for 1815, when the UK produced 22.3 million metric tons (mmt) of coal. By 1830 output had jumped to 30.5mmt, with only 500k metric tons being exported (Mitchell, 2003: 428, 477). By 1850 output had doubled to 62.5mmt, with practically non-existent exports numbering only 3k metric tons; 1910 saw 269mmt output, and exports at 63k metric tons. The zenith of UK coal production came in 1913, with 292mmt produced (ibid.: 433, 480).

In terms of its workforce 200,000 miners employed in 1850 but this had leapt to “well over a million by 1913;” but this increase in the workforce had been at the expense of almost no technological innovation at all: “the actual cutting at the [coal]face was still done arduously by a naked or near-naked man hacking at the coal with a pick[axe]” (Hall, 1981: 21). Little changed from World War I (WWI) to World War II (WWII). The only exception being that central government control of coal production during WWI meant that, for the first time, a single and coordinated body had authority over production. After the war ended, the efficiencies that this central control generated were requested by the Miners’ Federation to continue—along with shorter working days and appropriate recompense for labour expended. National control was never delivered, neither were better working conditions. Two national miners’ strikes (1921 and 1926) were dashed because of promised, and then withdrawn, support from the wider Trades Union movement (ibid.: 24).

136 Approximately 1780-1820.
During the interwar period huge changes took place in continental European mines, but almost nothing altered in Britain. Hall (ibid.: 26) draws intriguing comparisons between British and European coal mines. From 1913 to 1934, coal output in the Ruhr region and in Poland increased by 77% and 63% respectively, in Britain output increased a derisory 7%. Mechanisation of coal extraction in Ruhr mines went from 3% in 1913 to 97% by 1934; the same period saw British mechanisation not even reach 50%. By the mid-1930s there were still over 2,000 individually owned mines in Britain, with an average yearly output of 100,000 tons each. The Ruhr average was just under 1m tons per year, and for Dutch mines it was almost 2m tons a year. The fractured ownership of the British mines was a huge problem: none of them could (or would) invest in either technology or their workforce.

After WWII the Labour government nationalised coal production and established the National Coal Board (NCB). However, even the NCB was unable to successfully upgrade skills and standards because it became caught in a cycle of ever increasing demand for coal, meaning that even less productive pits were kept operating (Hall, 1981: 28). By the mid-1950s, coal was already having to be imported to meet domestic and industrial needs (although, as Mitchell states, this was largely insignificant until the early 1970s (2003: 485-6)). The railways, one of the largest consumers of coal, were already planning a move from steam to diesel, and the government was encouraging power stations to move from coal to oil. In 1956 Calder Hall opened, Britain’s (and the World’s) first electricity-generating nuclear station. By 1957 the demand for coal was dropping—as was the output from British mines. In 1957 227mmt was produced, this fell to 110mmt in 1974 (a mean average decline of 6.4mmt per year) (Hall, 1981: 31). However, a saviour for coal was the oil price shock of 1973-4: a barrel of Saudi Arabian light crude
went from $1.80 a barrel in 1970 to $11.65 at the end of 1973. With two spikes in world oil prices, coal returned as an attractive source of fuel.

Despite renewed demand, however, British coal mining did not expand that much as the years went on. As Fine, O'Donnell and Prevezer (1985b: 167) detail, between 1947 and 1982 the total per annum output of NCB mines fell from 187.5mmt to 108.9mmt; employment fell from 700,000 miners to just under 220,000; but shift productivity rose from 1.09 tons to 2.40 tons. This is related (ibid.: 168) to coal being used in three distinct periods: the first, from 1947-1956, was marked by increasing demand coupled with coal as the primary source of domestic fuel. From 1957-1974 there was an increasing switch from coal to both gas an oil as sources of domestic energy. However, the oil shocks started the third period from 1975-1982 (the present day for Fine et al) when oil prices were consistently so high that its use as a fuel source was all but abandoned. However, the stagnancy of the British economy during this time meant that even though other fuel sources declined, the demand for coal never really increased for Britain had “a large excess capacity in energy provision” (ibid.). While coal continued to be a fuel source, it was increasingly seen as suffering from a large militant trade union, the National Union of Mineworkers, as well as suffering from decreasing productivity—although Fine, O'Donnell and Prevezer (1985a: 184-7, 193) are adamant that deceases to productivity were the result of chronic underinvestment.

The privatisation of coal is explored by Fine (1990) in a very intriguing overview that outlines the core tenets of neo-liberal arguments.\(^{137}\) While not absolutely necessary

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\(^{137}\) Fine’s 10 different points include a combination of neo-liberal axioms and assumptions, as well as some of his own critiques against the neo-liberal arguments. (1) Withdrawing the state equates a market correction. (2) Neo-liberalism is largely an intuitive model (even though neo-liberalism claims to abhor intuition). (3) De-nationalising coal removes an artificially created monopoly of production. (4) That there are no knock-on effects from having private or public
for the discussion here, Fine’s 10 points highlight the political and ideological context that coal found itself in at the beginning of the 1990s (n.b. British Coal was eventually privatised in 1994.) Along with the perceived militancy of its unions—in the shadow, of course, of the national Miners’ Strike of 1984-5—coal mining was understood by Margaret Thatcher’s Conservative Government as an industrial anathema. The irony, as Fine outlines (ibid.: 166), is that it is only because of the 1947 nationalisation that the processes of mechanisation, upgrading, and training was able to occur that then produced a much more efficient and effective coal industry that existed in in the early 1990s. The highly fragmented ownership of private collieries prior to nationalisation was a structural impediment that could not be overcome within existing social conditions (a situation that foreshadows Althusser’s argument for a ‘dispositive’ and static conjunctions, see Chapter 3). It was only through nationalisation that the coal industry could begin to produce economies of scale, some form of rationalised planning, and any real upgrading.

All through the development of nuclear energy coal fluctuated in terms of its cost and perceived utility. With oil taken out of contention (after the price rises), coal was competing almost singly with nuclear energy as a source of electricity generation. However, the combination of the Conservative Government’s faith in nuclear energy (at least until privatisation, see below), their flagrant dislike of labour unions—especially the NUM—and their ideological commitment to private ownership of state industry, meant ownership of an industry. (5) Privatisation takes place in a socially neutral context (i.e. it ignores social conditions). (6) Neo-liberalism oversimplifies the relations between economics and politics (economic relations always comes before political relations). (7) No real study has been done of the benefits of the public sector—how has public provision differed from private provision, and what might have been different? (8) Market provision is a sufficient means of service provision. (9) Explicit rejection of all theory (except for neo-Austrian school) and that markets lead to events occurring (such as mass unemployment). (10) Failure of privatisation to produce desired results has been completely ignored, as has the (little) neo-liberal economic theory there actually is (Fine, 1990: 121-134).
that coal was continually under siege as a source of energy. When gas was finally deregulated and allowed to be used as a source of electricity (rather than for domestic and commercial heating and cooking), this finally sealed the fate of British coal.

Gas and Oil
Gas has been a staple British source of fuel for lamps, heating, and cooking beginning back in the early 1800s. Gas street lighting was a major innovation for urban London, as was the extension of gas lines in the 1920s to domestic households to provide fuel for stoves and heaters. Gas was manufactured through heating coal (so producing a gas from the chemicals contained within it) in a vessel containing steam which captured the combustible chemicals contained in the escaping gas; this was commonly called ‘town gas’. Nineteen forty-eight saw the nationalisation of gas services and the establishment of the National Gas Board: 12 regional areas supplying gas to domestic customers. Simpson (1966: 87) states that the largest market for gas was always domestic households. From 1955 gas production using coal declined significantly, this was due to the increasing importation of gas from sources outside of the local gas works (ibid.: 91, 94). Gas provision began to invest in liquified natural gas: methane liquefies at -161.5°C, taking only 1/600 of the space as it is in gaseous form, meaning that once mobile refrigeration technology was established, gas was able to be imported from foreign sources (mainly the Middle East) (ibid.: 98). In 1966, Britain identified gas reserves in the North Sea and moved to reduce reliance upon coal and the town gas that it produced. British Gas Corporation was established in 1972 (Helm: 2003: 38) as an arms length government agency, with the 12 Gas Boards becoming ‘regions’ under its remit. The switch to liquified gas produced, as Reid, Allen and Harris (1973: 118-20) recount, a huge strain on existing infrastructure as all existing gas appliances (stoves, heaters,
boilers, etc.) had to be converted from town gas use to natural gas use (for natural gas was twice as strong as town gas, gave off significantly more heat, and was pressurised to a higher level). Beginning in 1969, a 10 year period of appliance and (partial) infrastructure conversion began that cost an estimated £400 million.

By 1982, the Conservative Government has passed the Oil and Gas (Enterprise) Act that gave the government direct power to dispose of British Gas assets—by 1986 the Gas Act returned gas production and provision fully to the private sector; although, importantly, without breaking up British Gas as an organisation. The unwitting/unthinking creation of a monopoly service provider was actively worked against when the CEGB was privatised in the late 1980s (see discussion further below). Importantly, in the late 1980s the government sanctioned the use of gas for electricity generation (a previously heavily excluded activity). The development of combined-cycle gas turbine (CCGT) technology prompted the (in)famous “Dash for Gas” that occurred in the early 1990s (Helm, 2003: 166-171). The newly privatised electricity companies were keen to exploit the (relatively) cheap costs of building and operating gas power stations compared to coal and—most certainly—nuclear power stations.

The use of oil as a fuel source in Britain had a small surge in the late 1950s and through the 1960s, but apart from that it is almost non-existent. Before the two shocks to prices (see footnote 136 above, on p.203), oil was “20 per cent of British energy demand… increased from 5 per cent in a decade” and, in 1966, this situation was confidently expected to continue because “there is every indication that it will increase still more rapidly in the future” (Simpson, 1966: 103). Of course, the demand for oil did increase—but for the automotive industry and for the petrochemical industry. Britain’s reliance upon its empire and then upon a select few decolonised countries to provide cheap oil was a key part of the early adoption of oil as a fuel.
British Petroleum (BP) has roots dating back to 1909 with early oil exploration that took place in Persia/Iran, when it was founded as the Anglo-Persian Oil Company. In 1935 it became the Anglo-Iranian Oil Company and, over the years, became increasingly owned by the British government: a 50 per cent stake after WWI and close to a 25 per cent stake controlled by the Bank of England in 1975; in 1954 AIOC was renamed British Petroleum Co. During the first oil shock, there was considerable consternation in the British government that BP refused to give preferential treatment to Britain in the sale of its oil (Krapels, 1977: 17-18). Despite the government being a majority shareholder, BP acted, and was allowed to act, as a fully independent company. Partly in response to this insecurity, the British government set up the British National Oil Corporation (BNOC) in 1975 to explore and exploit the North Sea oilfields. Initially, this was a fully state-controlled corporation that was committed to exploring the newly discovered oilfields in the North Sea. From 1982 to 1987 government shares in BP shares were starting to be sold off and, with the powers of the Oil and Gas (Enterprise) Act 1982, BNOC was eventually fully privatised—by being virtually sold wholesale to the now fully private BP in 1987 (Helm, 2003: 61-63). Oil never really operated as a fully integrated fuel source, and never fully recovered from the first price shock; when the second occurred, it fully put to rest any possible use of oil as a fuel source.
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