Possible Mechanisms of Order Matching Effects in Attitude Persuasion

by

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Abstract

The *order persuasion matching effect* occurs when the sequencing of information within a persuasive message matches that of the information used to generate said attitude. This matching effect generates stronger attitude change compared to mismatching conditions. This effect has been documented for decades, first appearing in early studies investigating the affective/cognitive structure of attitudes. The order persuasion matching effect was interpreted as evidence for affective/cognitive matching, but subsequent studies have called this interpretation into question, with the most recent research suggesting that the effect may occur due to a violation of expectations or preferences of the nature of persuasive information. The present studies' goal was to provide more insight into the mechanisms driving the effect with focus on two non-exclusive interpretations. Study 1 explored the possibility that matching conditions enhanced processing via surprise at information that violated expectancies/preferences by manipulating argument quality to assess amount of processing across matching/mismatching conditions. Study 2 examined if the effect was a result of reduced counterarguing of persuasive information due to violation of expectations by employing arguments. Participants were presented arguments of ambiguous quality, which was expected to produce stronger counterarguing effects compared to strong or weak arguments. Both studies presented null findings counter to initial predictions; as a whole, the order persuasion matching effect was not observed in either experiment.

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Chapter 1: General Introduction

Attitudes are relatively enduring and global evaluations of a specific object, person, or concept of interest that range from a spectrum of positive to negative (Petty & Cacciopo, 1986). To better understand the complexity of attitudes and how they form and change, researchers theorized that attitudes contain various properties beyond simply being positive or negative. Many properties underlying the structure of attitudes have been recognized, such as attitude ambivalence, accessibility, and extremity (For review, see Fabrigar, MacDonald, and Wegener, 2005). Thus, although two people could report similar global evaluations, the structural bases by which they arrived at that those evaluations could be quite different. One particular property of attitude structure is that of the affective/cognitive distinction, which carries a number of implications in persuasion research.

Affect and Cognition in Attitudes

The distinction between emotions and rationality in experiences and thoughts can be traced as far back as Classical Greek philosophy. Plato likened the human soul to a chariot driver that had to direct two horses that often pulled in different directions, with one representing reason and logic and the other representing irrationality and emotion (Plato, ca. 370 B.C.E./2011). Theoretical discussions dating back to the late 1950s on the structure of attitudes followed this line of thought, conceptualizing them as multicomponent constructs (Katz & Stotland, 1959). Although some researchers believed that affect and cognition were relatively consistent with one another in terms of valence (Insko & Schopler, 1967), others posited that the presence or strength of each component could vary independently from attitude to attitude (Katz & Stotland, 1959). Empirical research largely supported the latter theory, using *affect* to refer to the positive or negative emotions surrounding one's attitude towards an object, and *cognition* to refer more to thoughts,

knowledge, and beliefs about various attributes towards the attitude object (Breckler, 1984; Crites, Fabrigar, & Petty, 1994; Fabrigar & Petty, 1999; Edwards, 1990; Edwards & von Hippel, 1995; Fabrigar, 1995; Ostrom, 1969). For instance, Crites, Fabrigar, and Petty (1994) found that attitudes toward snakes were largely based in affect, whereas attitudes towards capital punishment were more driven by cognition and beliefs. Variation in affect or cognition within an attitude can be observed across individuals, such that some people may rely more on cognition to form their attitudes as opposed to affect, or vice versa (e.g.,Huskinson & Haddock, 2004). While distinct, these two properties are not necessarily exclusive; the bases of attitudes can be mainly cognitive, mainly affective, or a combination of both (Zajonc & Markus, 1982).

Affect and Cognition in Persuasion

Research on the categorization of attitudes and how they form led to questions regarding the relationship between types of attitudes and different persuasion methods. Having established a distinction between the affective and cognitive dimensions of attitudes, researchers began to explore how attitudes of differing properties may respond differently to persuasive messages. If attitudes can be categorized into different types, then persuasive messages designed to change those attitudes would logically reflect a similar classification. In other words, persuasive messages can contain mostly affective or cognitive information. Thus, persuasive messages may vary in effectiveness at changing an attitude depending on the nature or structure of the message and the pre-existing attitude. This logic is the foundation for the prominent theory of the interaction between attitude structure and persuasive messages known as the matching hypothesis.

The matching hypothesis is an intuitive one; affective messages are effective in changing affective attitudes, and cognitive messages are more persuasive to cognitive attitudes. Katz and Stotland first presented this theory in 1959; they suggested that attitudes with strongly affective

components would prove resistant to cognitive persuasions, whereas attitudes strongly based in logic and reason would likely not be swayed by emotional appeals. However, at the time, no methodology was established for measuring or identifying the affective and cognitive components of an attitude and little understanding of how to manipulate participant attitude structure in an experimental setting. Thus, the matching hypothesis would not be tested for over 30 years.

In a seminal paper credited as the first demonstration of Katz and Stotland's (1959) hypothesis, Edwards (1990) conducted a series of studies that employed a novel methodological approach to the dilemma of manipulating the affective/cognitive bases of attitude structure. In her studies, Edwards alternated the order of information presented in either an affective/cognitive or cognitive/affective sequence. In the first study, participants in the affective/cognitive condition were exposed to a subliminal positive prime (a smiling face, meant to induce a positive affective attitude) before seeing a Chinese ideograph, then read a passage positively describing the ideograph before seeing it one more time. By being exposed to the affective prime before the passage, Edwards reasoned that participants would develop an affectively based attitude towards the ideograph. In the cognitive/affective condition, the stimuli were reversed (ideograph, passage, prime, ideograph). This manipulation whereby participants received cognitive information first was meant to induce a positive cognitively based attitude. Attitude responses toward the ideographs were recorded.

In the persuasion phase, participants were exposed to either a negative affective subliminal prime (a frowning face) followed by an exposure to the same ideograph. They then read a negatively valenced passage about the ideograph followed by the ideograph again, or the reverse (negative passage, ideograph, negative prime, ideograph) depending on the persuasion condition they were in. Participants then filled out another attitude score sheet towards the ideographs and

attitude changes were calculated. These conditions formed a 2 (order of information at attitude formation) x 2 (order of information at attitude persuasion) design manipulating the order of stimuli at both phases of the study, effectively creating two matching and two mismatching conditions across these phases. Edwards contended that the initial attitude formed towards the ideographs would be based in either affect or cognition depending on which stimulus was presented first to the participants, citing a primacy effect (i.e., if they were exposed to the prime first, they would have an affectively based attitude, and if they were exposed to the passage first, they would have a cognitively based attitude). Edwards' results showed that participants exposed to the affective prime before the cognitive passage displayed more attitude change when exposed to a persuasion of matching order (i.e., prime before passage).

In Edwards's (1990) second study, participants were brought into the lab under the premise that they would be testing a sports drink under consideration for public marketing. In the attitude formation phase, participants either tasted a sweet drink (affective/sensory stimulus) before reading a passage (cognitive/verbal stimulus) designed to create a positive attitude towards it or read the passage before tasting the drink. Then, in the persuasion phase, participants would either smell the beverage (made to be unpleasant, an affective/sensory stimulus) before reading a passage negatively describing the drink (cognitive/verbal), or vice versa. These conditions once again created a two by two design where participants were either presented information in matching (for instance, taste/read and smell/read) or mismatching (e.g., taste/read and read/smell) order. Participants were scored on their attitudes toward the drink at the formation and persuasion phases, and the change in attitude score represented the extent to which participants were persuaded. Edwards documented a significant interaction whereby participants in order matching conditions exhibited greater attitude change than participants in mismatching order conditions. In other

words, presenting the smell followed by the passage was significantly more persuasive if the initial information presented was in the order of tasting the drink, then reading the passage.

This set of studies was considered largely impactful at the time of publishing. While the idea of matching effects in persuasion had existed for decades (Katz & Stotland, 1959), Edwards' studies are often hailed a breakthrough in the field of attitudes and persuasion. Not only were they considered the first empirical evidence of manipulating the affective and cognitive dimensions of attitudes, but they also demonstrated the long-theorized matching effect of persuasion whereby ostensibly matching the structure of the persuasive message to the original information presented in the attitude formation phase, in fact, enhanced its effectiveness. Edwards would go on to replicate this matching effect using different methodologies (Edwards & Von Hippel, 1995), further demonstrating its robustness.

Interpretations of the Order Matching Effect

Although ample empirical evidence supports the order matching hypothesis, the mechanisms underlying the effect have been understudied. Edwards (1990) interpreted the results of her studies as evidence of an affect-cognition matching effect, whereby matching the order of affective and cognitive information during attitude formation and persuasion would lead to increased attitude change. Edwards reasoned that the nature of an attitude or a persuasive message depends on what kind of information is presented first (i.e., affective or cognitive). Hence, a participant with an affectively based attitude (e.g., having tasted a beverage before reading about it) would be more persuaded by a matching affectively based persuasion (smell/read). Conversely, cognitively based attitudes (reading before tasting) would be better changed by cognitively based persuasions (read/smell). However, this interpretation has been criticized for assumptions made regarding attitude structure that were not truly tested.

The assumption that exposure to an affective stimulus before a cognitive stimulus would generate an affectively dominant attitude (or the reverse) is debatable. Although Edwards has presumed a primacy effect (e.g., Miller & Campbell, 1959) to support this interpretation (whereby information presented first is more impactful), we have little reason to assume that the primacy effect would hold dominance over the recency effect (whereby information presented last is more impactful (e.g., Brodie & Murdock, 1977), which is also a valid and demonstrable phenomenon, or even a serial positioning effect (e.g., Glanzer & Cunitz, 1966), where information presented first and last is more memorable than information in the middle.

A recency effect would imply that the base of an attitude is determined by information presented second in Edwards' study, creating the reverse of her interpretation. What's more, a serial positioning effect interpretation would in fact support the mismatching hypothesis, whereby the first and last stimuli (e.g.,an affective stimulus and a cognitive persuasive passage in an affective/cognitive matching condition) would have the largest impact in attitude formation and persuasion. In any case, there is no compelling theoretical basis to assume that presenting an affective stimulus before a cognitive stimulus would directly cause the generation of an affectively based attitude. More importantly, Edwards did not present any empirical evidence for the primacy effect (or any other interpretation) in the measures or manipulations of the studies. The only definitive method of determining the structure of an attitude would be to measure it following exposure to the attitude formation stimuli.

To examine whether the structure of attitudes was based on the order in which stimuli were presented, Fabrigar (1995) replicated Edwards's (1990) beverage study but included an additional element into the design. To measure the affective/cognitive bases of attitudes generated by the stimuli, participants completed scales measuring overall attitude in addition to scales measuring

attitude affect and cognition in between the attitude formation and persuasion phases of the original study. This scale would be credited as one of the first widely accepted measures of affective/cognitive bases (Crites, Fabrigar, & Petty, 1994). The order persuasion matching effect was replicated; participants presented with information of matching order presented significantly greater attitude change than participants in mismatching conditions. Thus, the matching hypothesis was still supported. However, participants did not differ by condition in whether their attitudes were primarily affective or cognitive. This null effect implies that the order in which the information was presented (affective/cognitive or cognitive/affective) had no significant effect on whether a participant's attitude towards the beverage was primarily affective or cognitive. These results contradict the primacy effect interpretation of Edwards' results. However, the re-observed pattern whereby matching the order of attitude formation and persuasion stimuli enhances persuasion suggests that the order persuasion matching effect does not occur specifically due to affect/cognitive matching, but rather exists independent of the affective/cognitive distinction of attitudes (Turner, 2004; Pupco, 2018). This effect will henceforth be referred to as the *order persuasion matching effect.*

Turner (2004) reasoned that if the order persuasion matching effect is not dependent on the affective/cognitive distinction, then the effect should be replicable with other kinds of information not limited to an affect-cognition dichotomy. Notably, Turner provided an alternative explanation to Edwards' methodology as having a complexity confound, whereby the affective stimuli were one-dimensional and simple compared to the more multi-faceted cognitive stimuli. Turner argued that the matching effect discovered by Edwards (1990) and replicated by Fabrigar (1995) could be due to participant attitudes being more complex if they were first exposed to the cognitive information, thus changing how they might process future information about the same topic. For

instance, when participants are first exposed to unidimensional information (like an affective stimulus that either tastes good or bad), they might tend to incorporate future information into that single dimension instead of categorizing the information into separate groups.

To address this critique, Turner (2004) conducted a study that manipulated the order of information that was purely cognitive to observe whether the matching effect would occur independent of affective/cognitive matching. In her study, participants were brought into a lab and told that they would be reading information about a (fictitious) person named Sarah. In the first phase, participants read two passages positively describing Sarah, one relatively simple and short passage and one longer and more multidimensional passage. The simple passage concerned Sarah's popularity and contained statements like "many people like Sarah," and "she is a very agreeable person and no one has ever been involved in a confrontation with her." The complex passage described her work ethic, morals, and physical features and contained sentences like "[…] she is typically the first person to complete her task" and "she attends church regularly and has strong ties to her family." Participants then had their attitudes toward Sarah measured before engaging in a card sorting task where they thought of and wrote attributes about Sarah on cards. They were then instructed to group these cards into as many separate categories as they thought appropriate. Turner interpreted grouping attributes into a larger number of categories to be indicative of a more complex, multifaceted attitude (Edwards, 1992; Zajonc, 1960).

In the second phase, participants read passages describing the same attributes but in a negative valence. For instance, the simple persuasive passage contained sentences such as "Sarah is quick to develop artificial friendships and holds no long-lasting friendships" and "She sits with random people to eat lunch without them inviting her to do so." As in previous studies, the order of both sets of passages was manipulated to have both matching and mismatching conditions.

Thus, instead of affective/cognitive matching, Turner's (2004) study implemented a simple/complex passage matching design using only cognitive information. Turner predicted that in addition to finding a matching order effect, participants in the complex/simple attitude formation condition would report more complex attitudes in the form of grouping Sarah's attributes into more categories than participants in the simple/complex group.

Using this design, the study produced a robust order persuasion matching effect; participants who read the simple passage followed by the complex passage in both phases (or who read the complex followed by the simple passage) displayed greater attitude change than did participants in mismatching order conditions. This result provided support to the notion that the order persuasion matching effect existed outside of affective/cognitive matching, given that it manifested in a design using only cognitive materials. Turner (2004) presented two possible interpretations of the data (2004). First, the order matching effect could have been due to the order of complexity directly affecting participant attitudes at the formation phase. However, analyses of the card sorting task did not reveal a significant difference in attitude complexity across formation conditions. Although this could be due to a lack of sensitivity in the attitude complexity measure, no evidence currently supports this interpretation. Turner's second possible interpretation was that the order matching effect was not due to the structural properties of information presented, but rather due to participant expectancies. In other words, the ordering of information at the attitude formation phase could affect the nature of information that participants would expect to subsequently receive. The fulfillment or violation of these expectancies could distract or otherwise affect processing of subsequent information, which could affect its persuasive efficacy. In any case, additional research was required to investigate the mechanisms of the information order matching effect.

Although there is evidence to refute the affective/cognitive matching interpretation of Edwards' (1990) study, alternative explanations of the order persuasion matching effect remained relatively unexplored. Pupco (2018) followed up on Turner's (2004) study and hypothesized that after being exposed to information in a certain order, participants might expect or prefer future information to be presented in the same order; violation of these expectations could consume cognitive resources, diminishing one's ability and/or motivation to process a persuasive message.

Pupco (2018) closely replicated Turner's (2004) study by manipulating the order of passages describing Sarah, but with one key difference. After reading the initial positive passages but before reading the negative, participants answered three questions about the kinds of information they expected, were more interested in, and preferred to read more of in place of Turner's card sorting task. These questions were designed to see if participants presented information in a different order would show differences in their expectations/preferences of subsequent information. Pupco hypothesized that participant preferences and expectations for subsequent information would differ across order conditions; participants who read the simple passage about Sarah first would expect/prefer to receive more simple information, and participants who read the complex passage first would expect/prefer complex information.

Once again, the results of Pupco's (2018) study showed evidence consistent with a matching effect, whereby participants in matching order conditions displayed greater attitude change than did participants in mismatching order conditions. However, the recorded effect size was smaller than Turner's (2004) and did not reach statistical significance ($p = .154$). Pupco also found suggestive evidence that participants in different order conditions had different expectations and preferences of what kind of information would be presented. Participants were somewhat more likely to expect information matching the *second* piece of information that they were presented.

This expectation seems rather counterintuitive; if participants are expecting/preferring the information that they received second, then why are they exhibiting greater attitude change in the matching conditions and not the mismatching conditions, where the type of information presented second in the first phase is presented first in the second phase? Pupco suggested two possible, though not mutually exclusive interpretations for this pattern of findings. First, she suggested that the matching effect still occurred due to the initial persuasive information attacking arguments that are less retrievable and, therefore, less prone to cognitive challenging. As a result, matching the order of information of the persuasive message would enhance attitude change, as participants would be less cognitively prepared to engage information contrary to what they just learned. Second, being initially presented with information that is not of the expected/preferred nature may have violated expectations and produced a surprise reaction; this reaction could increase attentiveness and processing of arguments, which would subsequently enhance persuasion under the condition of strong arguments. While these interpretations are plausible, evidence that the order matching effect is due to improved cognitive processing of the persuasive message remains inconclusive.

Present Research

Edwards's (1990) studies presented compelling evidence for a matching order effect, but the interpretation of these studies was called into question by Fabrigar (1995), Turner (2004), and Pupco (2018) who provided evidence that Edwards' manipulation was not changing the affective/cognitive bases of participant attitudes and that the effect can be observed outside of an affective/cognitive information distinction, respectively. Turner demonstrated that matching the order of complexity in purely cognitive information could generate a matching effect but did not find evidence for her interpretation of an attitude complexity effect. Subsequently, Pupco found

marginal evidence suggestive of an expectations effect, whereby participants preferences and expectations guided what kind of subsequent information they would most readily process.

The strongest point of knowledge to gather from these past studies is that the order persuasion matching effect is robust and likely exists. The diversity of methodologies used to conceptually recreate this effect in conjunction with its significant replication in two independent labs provides substantial evidence towards its legitimacy and generality beyond specific stimuli or subject pools. Furthermore, evidence that the order matching effect is not exclusive to the affective/cognitive distinction is increasing (Fabrigar, 1995; Pupco, 2018; Turner, 2004). Despite this, Edwards's (1990) original studies continue to be cited (799 times according to Google Scholar) as evidence for affective/cognitive matching.

The order persuasion matching effect is intriguing in no small part due to its lack of intuitiveness; there is no obvious reason as to why matching the order of a persuasive message to the information used to generate an attitude would enhance its effectiveness by up to 20% while holding the actual information provided constant (Edwards, 1990; Edwards & Von Hippel, 1995; Fabrigar, 1995). Despite its significant and replicated enhancement of persuasion, no conclusive evidence exists as to what the underlying mechanism of the order persuasion matching effect is at the present time. Turner's (2004) complexity interpretation was not supported by data but should not necessarily be ruled out due to one nonsignificant manipulation check. On the other hand, Pupco's (2018) expectancies interpretation received marginal support, but it requires replication and further exploration into the underlying mechanisms that lead it to increase persuasiveness. Hence, the present research inquires further into the latter interpretation, which currently appears more promising.

The first objective of the present research was to attempt to replicate the order persuasion matching effect to further support its validity. The second objective was to attempt to replicate the expectation effect found in the study by Pupco (2018); while suggestive, the effect found by Pupco was relatively weak and requires replication. The third objective of this research was to explore the underlying mechanisms that cause information order matching to increase persuasion. Simply replicating an effect of expectations/preference does not explicitly inform us of the critical mechanics underlying the enhanced persuasion. I suggest two distinct, though not mutually exclusive processes that branch from expectancy/preference violations that may explain why receiving information counter to what was expected might enhance persuasion.

First, I propose that violating expectations might increase processing of subsequent arguments through surprise. Pupco (2018) previously hypothesized that the matching of order induces surprise by presenting information counter to what was expected/preferred. This surprise reaction subsequently increases attentiveness and processing of arguments, as shown by past research (for review, see Petty & Wegener, 1998). Previous research has demonstrated that a violation of expectations can lead to enhanced processing. For example, Maheswaran and Chaiken (1991) observed that participants in conditions where sequenced persuasive information was incongruently valenced (i.e.,positive information followed by negative, or vice versa) listed more relevant thoughts in a cognitive response task and accurately recalled more of the information compared to those in conditions where all persuasive information was the same valence. Similarly, Baker and Petty (1994) demonstrated that presenting information that was counter to a participants' existing attitudes framed as a majority opinion or presenting pro-attitudinal information as minority opinion increased scrutiny of argument quality; because participants were surprised to find that their attitude was not shared by the majority of people, they became more

attentive to persuasive arguments and displayed more attitude change to strong arguments and less to weak arguments compared to conditions where their attitude was framed as a majority opinion. Petty, Fleming, Priester, and Feinstein (2001) observed that scrutiny of argument quality could be enhanced in low need for cognition participants by presenting information that disconfirmed their expectations. Based on this literature, the enhanced processing via violation of expectations/preferences interpretation of the order persuasion matching effect is a reasonable one.

A second possible mechanism underlying the expectation violation effect is that of counterarguing. If participants are expecting/preferring additional information of a certain type, they may be more cognitively prepared to engage with such information. Because counterattitudinal information must engage with pre-existing attitudes, participants may be less prepared to engage and potentially counterargue any counterattitudinal information that is not of the type that they are expecting or preferring. Thus, persuasion would be enhanced in matching conditions, where expectations of the nature of subsequent information (i.e., the information type they received most recently) are violated. Evidence of counterarguing could be measured via thought listings reported by participants following exposure to a persuasive message. Thus, the second study of the present research examined the information order matching effect in the context of thought listings and counterarguments. I reasoned that detecting counterarguing in the case of very strong and very weak arguments is difficult; very strong arguments are by nature resistant to most counterarguments, and weak arguments provide too many strong counterarguments, both of which may blur the disparity of counterarguing across conditions. Thus, the second study of the present research employed new materials designed to increase the potential for counterarguing in an effort to maximize the observed effect.

Chapter 2: Study 1

The goals of Study 1 were to replicate the persuasion order matching effect using similar materials as Turner (2004) and Pupco (2018) as well as to establish stronger evidence of an expectation effect as found by Pupco. Furthermore, Study 1 examined the mechanism of the persuasion order matching effect from the perspective of a processing effect. If violation of expectations/preferences is the process that leads to enhanced persuasion, then this process may somehow lead to increased motivation to process persuasive arguments. Research done from the perspective of the Elaboration Likelihood Model has demonstrated that conditions of increased processing (by increasing motivation or ability to closely examine information) polarizes the effects of argument quality on persuasion (Petty & Cacioppo, 1984); in other words, strong arguments are more persuasive and weak arguments are less persuasive under conditions of high processing. Conversely, under conditions of low processing of a given message, conditions of weak arguments and strong arguments show less disparity in attitude change. Materials used by Turner (2004) and Pupco (2018) have employed only strong persuasive arguments about the character Sarah (e.g.,“she is very argumentative and rarely on good terms with people”), which by themselves cannot demonstrate evidence of enhanced processing in matching order conditions. Thus, the present research introduced a manipulation of argument quality where participants were exposed to persuasive arguments that were either strong or weak. If participants in matching order conditions do indeed experience enhanced processing, then strong and weak argument conditions should show greater disparity compared to those in mismatching conditions, where processing is supposedly lower.

Furthermore, Turner (2004) and Pupco (2018) did not employ cognitive response tasks, which can be coded to detect both amount of issue-relevant thinking (i.e., processing) and counterarguing. As measuring amount of processing and counterarguing is instrumental to the purpose of the present study, I also implemented a cognitive response task. However, cognitive response tasks have the limitation of being intrusive in the sense that they invite participants to reflect more effortfully on information than they may have previously been inclined to, thus inflating elaboration. To minimize this effect, participants completed it after the attitude rating scale.

Participants

Four hundred sixty-eight participants were recruited from the first year psychology student pool at Queen's University. They participated in the study as part of an online study package using Qualtrics that included other unrelated psychology studies. A minimum participant goal of 400 was set to achieve 50 participants per cell in a 2x2x2 study design; once this goal was reached, data collection continued to the end of the academic year in order to maximize power. One participant's data was excluded from analysis due incomplete item responses. A sensitivity analysis revealed that a study of this sample size and design would be sufficient to detect a three-way effect of $f^2 = .037$. Participants were compensated with course credit for their time.

Design

Study 1 was composed of a 2 (order of information at attitude formation: simple/complex or complex/simple) x 2 (order of information at attitude persuasion: simple/complex or complex/simple) x 2 (argument quality: strong or weak persuasive arguments) between subjects design.

Procedure

Attitude Formation. Participants read a brief letter of information and consent form explaining the tasks the study would entail (for these documents and all other pertaining to ethics, see Appendix A). Then, participants were randomly assigned to one of two conditions of attitude formation: simple/complex or complex/simple. All participants read two passages describing a fictitious character named Sarah (For these passages and all other materials for Study 1, see Appendix B). One passage was relatively simple, focusing on Sarah's popularity (e.g., "She is quick to develop friendships with others and has many friends"). The other passage was more complex and multifaceted, focusing on multiple aspects of Sarah, such as her work ethic, morals, and physical attractiveness. An example of a statement about her work ethic is "she is always typing away at her computer and consistently getting tasks completed quickly." An example of a statement about her morals is "She is able to distinguish between right and wrong and good and bad." An example statement about her physical appearance is "She has a very attractive face, smooth flawless skin, and beautiful sparkling blue eyes." These passages are the same as those materials used in studies by Turner (2004) and Pupco (2018). Participants in the simple/complex condition read the simple passage first followed by the complex passage, whereas participants in the complex/simple condition read the passages in the reverse order. Participants then completed an attitude measure assessing their attitudes towards Sarah. Following the attitude formation phase, participants answered three questions regarding what kind of information participants preferred to hear more (Sarah's popularity or her work ethic and morals), which information interested participants more, and what kind of information participants may expect to read more of. These questions are the same as the ones in the study by Pupco (2018).

Persuasion Phase. Finally, participants read two more passages about Sarah. These passages mirror the passages from the Attitude Formation phase in that they describe the same aspects of Sarah in the same structure, only in a negative way. Notably, these persuasive messages were designed to undermine the information presented at Attitude Formation and invite reevaluation, but they did not directly contradict any of the statements made previously. Participants were randomly assigned to a simple/complex or complex/simple order condition determining which passage they would read first and second, independent of the condition they were assigned in the attitude formation phase. Participants were additionally assigned to a strong or weak argument quality condition that determined whether the negative passages that they read would consist of strong or weak arguments. Materials for strong argument passages were taken from previous studies (Turner, 2004; Pupco, 2018) and interpreted to be strong because of substantial attitude change observed in those studies upon exposure to the messages (both averaged over 3 points in attitude change on a 1 to 7 scale). Weak arguments were created by modifying the content of the original strong argument materials to be more mild as well as less diagnostic of Sarah's character.

Thus, there were four possible conditions for participants to be assigned to at this phase: strong simple/strong complex, weak simple/ weak complex, strong complex/ strong simple, and weak complex/ weak simple. For example, a strong persuasive argument about Sarah would be "Sarah exerts effort and focus only on a select few tasks that she enjoys," whereas an example of a weak argument would be "While Sarah is typically hardworking, there are a few tasks at work that she does not enjoy and puts less effort into." Following reading the passages, participants completed the same attitude measure as in the Attitude formation phase assessing their attitude towards Sarah in addition to a thought listing cognitive response task. At the end of the task,

participants were thanked for their participation, informed that this study was over and received a briefing form.

Measures

Attitude Measure. Attitudes toward Sarah at both the Attitude Formation and Persuasion phases were measured using the same scale developed by Crites, Fabrigar, and Petty (1994) (For this and all other measures pertaining to the study, see Appendix C). Participants rated the extent to which each scale item described Sarah. These eight items are split into four positive words (e.g., *desirable, good, like, positive*) and four negative words (e.g., *undesirable, bad, dislike, negative*) and were presented to participants in random order. The rating scale ranges from 1 (*not at all*) to 7 (*definitely*). Items containing negative words were reverse coded and all items were averaged to create an overall attitude score for each phase of the study ranging from 1 to 7, where lower scores denote a more negative attitude towards Sarah.

The mean overall attitude score at the Attitude Formation phase was 6.1 (*SD* = .8) with a skewness of -1.30 (*SE* = .1) and a kurtosis of 2.18 (*SE* = .22); in general, participants had a very positive attitude towards Sarah. The eight scale items showed a good reliability (Cronbach's α = .90). The mean overall attitude score at the Persuasion phase was 4.2 (*SD* = 1.4) with a skewness of -.262 (*SE* = .11) and a kurtosis of -.57 (*SE* = .22). Once again, the eight scale items showed a good reliability (Cronbach's α = .96).

Expectations, Beliefs, and Preferences. Identical to the measure found in Pupco's (2018) study, this measure contains three questions. Participants selected on a scale from 1 to 7 what kind of information they preferred, were more interested in, and expected to see more of. Lower scores align more with simple information about Sarah (i.e.,her popularity), whereas higher scores align more with complex information (morals, values, work ethic). Similarly to the

Attitude Measure, these scores were averaged to form an overall Expectation score. However, because the items correlated only modestly as was the case in Pupco's (2018) findings (correlations ranged from .14 to .33), they were also analyzed separately.

The mean Interest score across participants was 5.1 (*SD* = 1.6) with a skewness score of -.730 (*SE* = .11) and kurtosis of .018 (*SE* = .22). On average, participants were more interested in information about Sarah's morals, work ethic, and appearance. The mean Preference score across participants was 5.4 (*SD* = 1.8) with a skewness score of -.928 (*SE* = .11) and kurtosis of -.047 (*SE* = .22). On average, participants preferred information about Sarah's morals, work ethic, and appearance. The mean Expectation score across participants was 4.6 (*SD* = 1.9) with a skewness score of -.351 (*SE* = .11) and kurtosis of -.826 (*SE* = .22). On average, participants slightly expected subsequent information about Sarah's morals, work ethic, and appearance. The overall Expectation/Preference score across participants was 5.0 (*SD* = 1.3) with a skewness score of -.603 (*SE* = .11) and kurtosis of .176 (*SE* = .22). Overall, participants preferred and expected information concerning Sarah's morals, work ethic, and appearance. Scale items had overall weak internal consistency (Cronbach's $\alpha = .59$).

Thought Listing Measure. The thought-listing technique (Cacciopo, Hippel, & Ernst, 1997) asks participants to record any thoughts they may have regarding the information they just received. In this case, participants were prompted to reflect on the information presented in the Attitude Persuasion task and record up to 10 separate thoughts regarding said information. If participants had no further thoughts they wished to list, then they indicated "none" for the remainder of available thoughts. These thought listings were coded by an independent rater blind to condition who categorized whether the thought was relevant or irrelevant to Sarah or the passages, and then whether that thought was positive, neutral, or negative with respect to Sarah

(1, 0, -1, respectively). These codings were subsequently transformed by summing up the valence scores of relevant thoughts and dividing by total number of relevant thoughts. This transformation created an index of thought favorability that ranges from -1 to 1, where a score of -1 denotes that all relevant thoughts were negative and a score of 1 denotes that all relevant thoughts were positive. To confirm reliability, a second researcher coded a portion of the thought listings (20%) so that inter-rater agreement could be assessed. The inter-rater correlation of thought favorability was r = .84, indicating a good level of inter-rater reliability. The inter-rater correlation of thought relevance was r = .97, indicating a very high level of inter-rater reliability.

On average, participants listed 4.2 relevant thoughts about Sarah (SD = 2.9). Participants displayed an average index of favorability of -.22 (SD = .58), denoting an overall slightly negative favorability toward Sarah post-persuasive messages.

Results

Preliminary Analyses

We ran an independent samples t-test comparing pre-persuasion attitude scores across conditions of order of information at attitude formation; this was done to verify that initial attitudes did not significantly differ as a function of which passage participants received first. Participant attitudes toward Sarah in the simple/complex condition (M = 6.2, SD = .8) did not differ significantly from attitudes in the complex/simple condition (M = 6.1, SD = .9), $t(465)$ = 1.05, p = .294, Cohen's d = .117. Overall, aggregate participant attitudes toward Sarah exceeded the 6-point mark, denoting highly positive attitudes on a 1 (*extremely negative*) to 7 (*extremely positive*) scale. Thus, the materials achieved the desired goal of creating an overall positive attitude of Sarah that was comparable across order conditions.

I ran a paired samples *t*-test comparing attitudes pre-persuasion and post-persuasion to confirm that our persuasive materials were sufficient to produce significant attitude change. Participant attitude scores pre-persuasion ($M = 6.1$, $SD = .8$) were significantly higher than participant attitude scores post-persuasion ($M = 4.2$, $SD = 1.4$), $t(466) = 24.92$, $p < .001$, Cohen's $d = 1.67$. Overall, the persuasive materials participants were exposed to were effective in inducing attitude change.

Order of Information Matching Effect

Recall that the order of information persuasion effect manifests as increased attitude change following exposure to persuasive information of matching order to information presented at attitude formation as opposed to mismatching information. I predicted that this effect was due to increased processing, which would increase the disparity of the persuasiveness of strong vs. weak arguments in matching conditions vs. mismatching conditions.

To test this hypothesis, we ran a 2 (order of information at attitude formation: simple/complex vs. complex/simple) x 2 (order of information at persuasion: simple/complex vs. complex/simple) x 2 (persuasive argument strength: strong vs. weak) factorial analysis of covariance (ANCOVA) framing persuasion phase attitude scores as the dependent variable and attitude formation phase attitude scores as a covariate[1]. I expected a three-way interaction to emerge from this analysis whereby the effect of argument strength (whereby attitude change is weaker in weak argument conditions compared to strong argument conditions) is stronger under conditions of matching order of information at the attitude formation and persuasion phases. Contrary to previous studies, I did not predict a significant two-way interaction of matching

[1] For full source data output of this analysis and all other studies, see Appendix D.

order whereby attitude change would be greater in conditions of matching information order vs. mismatching order. This was because the inclusion of a weak argument condition would attenuate overall attitude change and possibly even produce a reverse effect where attitudes toward Sarah become even more positive. Thus, the inclusion of this argument quality manipulation could eliminate a two-way interaction if a three-way interaction was observed.

The factorial ANCOVA revealed a significant main effect of argument strength on post-persuasion attitudes. Bearing in mind that lower attitude scores represent more attitude change, participants in strong argument conditions displayed significantly more persuasion of Sarah (M = 3.34, SE = .83) compared to participants in weak argument conditions (M = 4.96, SE = .83), $F(1, 458) = 188.79$, $p < .001$, $\eta_p^{2 =}$ .292. Overall, this demonstrates that the argument strength manipulation was successful, with strong argument passages manifesting significantly more attitude change compared to the weak argument passages.

I also found an unexpected but significant main effect of order of information at attitude formation on post-persuasion attitudes; participants in the complex/simple attitude formation condition were more persuaded by the passages (M = 3.9, SE = .82) compared to those in simple/complex conditions (M = 4.4, SE = .83), $F(1, 458) = 16.24$, $p = .008$, $\eta_p^2 = .034$.

The traditional two-way interaction of order of information at attitude formation and order of information at persuasion was not significant; participants in matching order conditions did not display significantly different attitude change compared to mismatching conditions, $F(1, 458) = .70$, $p = .791$, $\eta_p^2 < .001$. However, this null effect was expected due to the inclusion of our argument strength manipulation. We had no specific predictions about the other two-way interactions in this model. The interaction between order of information at persuasion and argument strength was not significant, $F(1, 458) = .70$, $p = .630$, $\eta_p^2 = .001$. However, the

interaction between order of information at attitude formation and argument strength was significant, $F(1, 458) = 7.07$, $p = .008$, $\eta_p^2 = .015$. There was a smaller mean difference in post-persuasion attitudes between strong ($M = 3.3$, $SE = .09$) and weak ($M = 5.0$, $SE = .14$) conditions in the simple/complex order condition at attitude formation compared to the strong ($M = 2.9$, $SE = .13$) and weak ($M = 4.9$, $SE = .09$) argument conditions in the complex/simple conditions.

The three-way interaction between order of information at attitude formation, order of information at persuasion, and argument strength was not significant; argument quality did not moderate the effect of matching vs. mismatching order conditions on attitudes post-persuasion, $F(1, 458) = .034$, $p = .854$, $\eta_p^2 < .001$. This null finding runs counter to my predictions of a significant three-way interaction, where the effect of argument strength would be enhanced in conditions of matching order as opposed to mismatching order.

Expectations and Preferences

My next analysis was focused on testing the hypothesis that the order of information presented at attitude formation altered participants' expectations or preferences of the type of information they would subsequently receive. Findings from Pupco (2018) suggest a recency effect, whereby participants reported being more interested in, preferring, and expecting information pertaining to the most recent passage they read. Thus, I predicted a similar trend.

I conducted four independent samples *t*-tests comparing participant scores for Interest, Preference, Expectation, and the aggregate of the previous three measures across conditions of order of information at attitude formation (simple/complex vs. complex/simple). I predicted higher scores of these measures in simple/complex conditions (denoting more interest in Sarah's morals, ethics, and physical appearance), demonstrating preference/expectancy of information

more recently presented compared to complex/simple conditions. None of these analyses revealed a significant difference.

Means associated with each measure as well as the aggregate index are presented in Table 1. Overall, measures of participant interest, preference, and expectation all failed to produce a significant effect across conditions of order of information at attitude formation. The aggregate index of interest, preference, and expectation also failed to produce a significant effect. Indeed, the observed mean differences all trended in the opposite direction of what I predicted based on what was previously found by Pupco (2018). In other words, although nonsignificant, participants in the complex/simple condition expressed more interest, preference, and expectation that subsequent information pertain more to Sarah's morals, work ethic, and physical appearance.

Table 1

Expectation/Preference Scores Across Conditions of Order at Formation

	Simple/Complex Mean (*SD*)	Complex/Simple Mean (*SD*)	*t*(465)	*p*
Interest	5.1 (1.7)	5.2 (1.5)	-.97	.33
Preference	5.3 (1.8)	5.4 (1.7)	-.64	.52
Expectation	4.5 (1.8)	4.6 (1.9)	-.70	.48
Aggregate	5.0 (1.3)	5.1 (1.2)	-1.03	.30

Note. Comparison of mean expectation/preference scores for participants across conditions of order at formation, with *t*-values for reference.

Thought Favorability

Thought listings were coded into an index of thought favorability by coding a valence to every relevant thought listed by a participant and creating an aggregate for each participant. This aggregate valence served as an indicator for how positive and negative a participant's listed

thoughts about Sarah were overall. Although examining the amount of attitude change is the most well-known way of assessing persuasive impact, it is also measurable through the favorability of thoughts generated in response to a message. Given that cognitive response requires a comparably large amount of effort, such an approach would emphasize the more thoughtful elements of attitude change processes. Thus, comparing and contrasting the pattern of these results with attitude reports would be useful because attitude reports cannot differentiate between peripheral and more elaborated processing.

I conducted a 2 (order of information at attitude formation) x 2 (order of information at persuasion) x 2 (argument strength) full factorial analysis of variance (ANOVA) framing index of thought favorability as the dependent variable to observe any effects or interactions these variables had on the favorability of expressed thoughts. Referring back to our original predictions that matching order conditions increase processing, and by extension the persuasiveness of a strong message (and lowering that of a weak message), I predicted a three-way interaction similar to those of reported attitudes, whereby the discrepancy of favorability between strong and weak argument conditions in would be greater in matching conditions of order of information compared to mismatching conditions.

The overall model was significant, $F(7, 458) = 19.08$, $p < .001$, $\eta_p^2 = .226$. As expected, there was a significant main effect of argument strength whereby thought favorability towards Sarah was substantially more negative in strong argument conditions ($M = -.48$, $SE = .33$) compared to weak argument conditions ($M = .05$, $SE = .33$), $F(1, 458) = 128.1$, $p < .001$, $\eta_p^2 = .219$. As I predicted, there was no significant main effect of order of information at attitude formation ($F(1, 458) = 1.82$, $p = .178$, $\eta_p^2 = .004$) or order of information at persuasion ($F(1, 458) = .89$, $p = .766$, $\eta_p^2 < .001$). There were no significant two-way interactions; neither the effect of

order at attitude formation nor the effect of order at persuasion varied as a function of attitude strength ($F(1, 458) = .52$, $p = .472$, $\eta_p^2 = .001$, and $F(1, 458) = .836$, $p = .361$, $\eta_p^2 = .002$, respectively). In addition, the traditional two-way interaction between order of information at attitude formation and order of information at persuasion was non-significant, $F(1, 458) = .282$, $p = .595$, $\eta_p^2 = .001$. This null effect was expected due to the nature of our argument quality manipulation creating a predicted three-way interaction. Contrary to my predictions, the three-way interaction between order of information at attitude formation, order of information at persuasion, and argument strength was also nonsignificant, $F(1, 458) = 1.54$, $p = .215$, $\eta_p^2 = .003$. The interaction between orders of information at attitude formation and persuasion did not vary substantially as a function of our attitude strength manipulation.

In brief summary, the favorability index of thought listings closely parallels the patterns I observed with post-message attitude reports.

Amount of Issue-Relevant Thinking

Recall that the index of thought relevance was obtained by coding each thought listed by a participant as relevant to Sarah and the passages, and summing the total of relevant thoughts for each participant. This procedure produces an index for each participant of the extent to which they expressed issue-relevant thoughts, from which I can infer how much a participant processed the passages. I conducted a second factorial ANOVA using the thought listing indices, this time framing the index of thought relevance as the dependent variable to explore a 2x2x2 model across variables of order at attitude formation, order at persuasion, and argument strength. Recall that the index of thought relevance was obtained by coding each thought listed by a participant as relevant to Sarah and the passages, and summing the total of relevant thoughts for each participant. Bearing in mind my general prediction that matching conditions of order should

increase processing, participants with increased processing should also express a higher number of relevant thoughts. Thus, I predicted that participants in matching order conditions would list more relevant thoughts than those in mismatching conditions (i.e.,a two-way interaction between information order at formation and persuasion phases).

The overall model was not significant, $F(1, 458) = 1.15$, $p = .331$, $\eta_p^2 = .017$. There were no significant main effects of order at formation, order at persuasion, or argument strength ($F(1, 458) = .79$, $p = .373$ $\eta_p^2 = .002$; $F(1, 458) = .89$, $p = .346$, $\eta_p^2 = .002$; $F(1, 458) = .473$, $p = .492$, $\eta_p^2 = .001$, respectively); participants did not differ significantly in quantity of reported relevant thoughts as a function of any of these variables. The traditional two-way interaction between order at formation and order at persuasion was also non-significant, $F(1, 458) = 1.10$, $p = .296$, $\eta_p^2 = .002$. Counter to our predictions, participants in matching conditions did not express significantly more thoughts than those in mismatching conditions. However, I found an unpredicted but significant interaction between order at persuasion and argument strength, $F(1, 458) = 4.47$, $p = .035$, $\eta_p^2 = .010$. Strong arguments elicited more issue-relevant thinking than weak arguments in the complex/simple persuasive passage condition ($M = 4.4$ $SE = .26$ and $M = 4.2$, $SE = .26$, respectively). This difference in issue-relevant thinking was smaller in the simple/complex condition ($M = 4.1$ $SE = .26$ and $M = 4.0$, $SE = .27$, respectively). The third two-way interaction between order at attitude formation and argument strength was nonsignificant, $F(1, 458) = .03$, $p = .861$, $\eta_p^2 < .001$. Finally, the three-way interaction between orders of information at attitude formation and persuasion and argument strength was not significant, $F(1, 458) = .268$, $p = .605$, $\eta_p^2 = .001$.

Discussion

Ultimately, I found no evidence that order at formation affected people's expectations or preferences of information. Indeed, participant expectations/preferences trended weakly in the opposite direction than what was predicted. Furthermore, I found no classic order matching effect or that the effect was moderated by argument quality. The ANCOVA for our attitude measure revealed none of the predicted effects (including the three-way interaction), nor did the ANOVAs for our thought indices of issue-relevant thinking or thought favorability. Implications for these results are elaborated upon in the General Discussion section.

Chapter 3: Study 2

While Study 1 explored the possible mechanism of enhanced processing following a violation of expectations, Study 2 examined the possibility of a counterarguing phenomenon. If the driving force behind the order matching effect lies in participants generating more counterarguments for the information type most recently presented in the attitude formation phase, then the effect should be enhanced if the information provided gives more opportunities to counter-argue. In order to achieve this, argument quality should be manipulated such that it is not so strong as to completely preclude any possible points to counterargue, but also not so weak as to completely nullify a simple persuasion effect. Thus, the ideal persuasive message to detect counterarguing would be one of ambiguous strength and leaves openings for counterpoints while remaining somewhat persuasive.

Method

Participants

Participants consisted of 220 students from the undergraduate participant pool at Queen's University, excluding those who already participated in Study 1. A minimum sample goal of 200 was set in order to achieve a minimum of 50 participants per cell in a 2x2 study design, with data collection after the minimum being met continuing to the end of the academic year so as to maximize power. Data from two participants was excluded from analysis due to incomplete item responses. A sensitivity analysis revealed that a study of this sample size and design would be sufficient to detect a two-way interaction of $f^2 = .072$. Participants were compensated with course credit for their time.

Design

The present study employed a 2 (order of information at attitude formation) x 2 (order of information at attitude persuasion) between-subjects design to compare the attitude changes of participants in matching vs. mismatching conditions.

Procedure

Attitude Formation Phase. This phase was identical to that of Study 1; participants were randomly assigned to read passages positively describing Sarah in the order of either simple/complex or complex/simple. Then, they completed an attitude measure assessing their views towards Sarah. Finally, participants completed the expectations measure assessing their preferences, interests, and expectations of the nature of subsequent information that would be provided.

Persuasion Phase. Following the attitude measure, participants were presented with two passages negatively describing Sarah. As in Study 1, they were randomly assigned to read the passages in the order of either simple/complex or complex/simple. These passages were of ambiguous strength (for these passage and all other materials pertaining to Study 2, see Appendix D) but were based off of and addressed the same topics as the passages in the Attitude Formation phase. Persuasive arguments of ambiguous strength were created by drawing from the original passages about Sarah and modifying them to be less negative, then comparing them to the weak argument passages made for Study 1 and modifying them to be somewhat stronger than the weak arguments. Thus, the present study employed a set of persuasive passages that served as a midpoint of argument strength between the previous strong and weak variants. For example, an ambiguous persuasive statement about Sarah's work ethic is "Sarah typically arrives to work on time, but has been late before." (Compared to the parallel strong statement "Sarah tends to

arrive to work late in the mornings and take extra long breaks throughout the day," and the parallel weak statement "Although usually punctual, Sarah has arrived to work late a couple of times.") Following these passages, participants completed a thought-listing task and a final attitude measure assessing their views towards Sarah.

Measures

Attitude Measure. Like in Study 1, attitudes towards Sarah were measured using an eight-item scale asking participants to rate from 1-7 the extent to which they agree four positive and four negative words best describe their attitudes towards Sarah. The difference in attitude scores at the Attitude Formation phase and the Persuasion phase served as a measure of persuasion, whereby a greater difference in attitude score would signify greater attitude change.

The mean overall attitude score at the Attitude Formation phase was 6.0 (SD = .7) with a skewness of -.632 (SE = .16) and a kurtosis of -.10 (SE = .33). Thus, participants had a very positive attitude towards Sarah. The eight scale items showed a good reliability (Cronbach's α = .89). The mean overall attitude score at the Persuasion phase was 4.6 (SD = 1.0) with a skewness of -.416 (SE = .16) and a kurtosis of -.1 (SE = .33). Once again, the eight scale items showed a good reliability (Cronbach's α = .93).

Expectations, Beliefs, and Preferences. Once again, this three-item measure assessed what kind of information participants preferred, were more interested in, and expected to see more of. It ranges from 1-7, with lower values aligning more with simple information (Sarah's popularity) and higher values aligning more with complex information (Sarah's work ethic, character, etc.).

The mean Interest score across participants was 5.0 (*SD* = 1.6) with a skewness score of -.741 (*SE* = .16) and kurtosis of .029 (*SE* = .33). On average, participants were more interested in information about Sarah's morals, work ethic, and appearance. The mean Preference score across participants was 5.2 (*SD* = 1.8) with a skewness score of -.885 (*SE* = .16) and kurtosis of -.031 (*SE* = .33). On average, participants preferred information about Sarah's morals, work ethic, and appearance. The mean Expectation score across participants was 4.4 (*SD* = 1.9) with a skewness score of -.199 (*SE* = .16) and kurtosis of -1.00 (*SE* = .33). On average, participants slightly expected subsequent information about Sarah's morals, work ethic, and appearance. The overall Expectation/Preference score across participants was 4.9 (*SD* = 1.3) with a skewness score of -.536 (*SE* = .11) and kurtosis of .293 (*SE* = .33). Overall, participants preferred and expected information concerning Sarah's morals, work ethic, and appearance. Scale items were overall weakly consistent (Cronbach's $\alpha = .56$) with inter-item Pearson correlations ranging from .14 to .40.

Thought Listing Measure. Similar to Study 1, the thought-listing task prompted participants to reflect on the passages presented in the Persuasion phase and record up to 10 thoughts they may have about it. Thoughts were coded by an independent rater blind to condition for issue relevance and valence, and subsequently transformed into an index of thought favorability. Thoughts that were positive or supportive of Sarah's character (positive) were interpreted as contrary to the content of the persuasive passages and thus coded as counterarguing. Once again, the index of thought favorability was calculated by dividing the valence score of thoughts coded as relevant by the total relevant thoughts. Relevant positive thoughts were coded as +1 and relevant negative thoughts as -1 (neutral thoughts were coded as 0). To confirm reliability, a second coder coded a portion of the thought listings (20%) so that

inter-rater agreement could be assessed. The inter-rater correlation for thought favorability was r = .82, indicating an acceptable level of inter-rater reliability. The inter-rater correlation for thought relevance was r = .95, indicating a very high level of inter-rater reliability. These codings were transformed by summing up the valence scores of relevant thoughts and dividing by total number of relevant thoughts. This procedure created an index of thought favorability that ranges from -1 to 1, where a score of -1 denotes that all relevant thoughts were negative and a score of 1 denotes that all relevant thoughts were positive.

On average, participants listed 3.7 relevant thoughts about Sarah (SD = 2.3). Participants displayed an aggregate index of favorability of -.073 (SD = .53), denoting average neutral thought favorability across all observations.

Results

Preliminary Analyses

As in Study 1, I conducted an independent samples t-test comparing reported attitudes at the attitude formation phase across conditions of order at attitude formation. Initial attitudes of participants toward Sarah in the simple/complex condition (M = 6.1, SD = .7) did not significantly differ from participants in the complex/simple condition (M = 5.9, SD = .8), $t(216) = 1.54$, p = .126, Cohen's d = .266. In addition, I conducted a paired samples t-test comparing attitude scores at the attitude formation phase and at the persuasion phase to determine whether the persuasive manipulation created a significant level of desired attitude change. Participant attitudes toward Sarah were significantly more negative after the persuasion phase (M = 4.6, SD = 1.0) compared to the attitude formation phase (M = 6.0, SD = .7), demonstrating the effectiveness of my persuasion manipulation, $t(216) = 18.78$, $p < .001$, Cohen's d = 1.62. As expected, post-persuasion attitudes toward Sarah were more positive using ambiguous arguments

compared to the strong argument condition in Study 1 (M = 3.3, SE = .82) but less positive than the average post-persuasion attitude of participants in the weak argument condition (M = 5.0, SE = .83), although the ambiguous arguments produced attitudes that were closer to weak arguments than strong arguments.

Order of Information Matching Effect

As was demonstrated in past literature, I predicted a significant interaction between conditions of order at formation and at persuasion whereby participants in matching conditions would display significantly greater persuasion compared to participants in mismatching conditions. To test this hypothesis, I conducted a 2 (order of information at attitude formation, simple/complex vs. complex/simple) x 2 (order of information at persuasion, simple/complex vs. complex/simple) analysis of covariance (ANCOVA) framing attitudes at the persuasion phase as the dependent variable and attitudes at attitude formation as a covariate.

The analysis yielded no significant main effects; order of information at attitude formation or at persuasion did not predict a difference in attitudes post persuasion (F(1, 213) = 1.21, p = .273, η_p^2 = .006, and F(1, 213) = 1.35, p = .246, η_p^2 = .006, respectively). This result was expected considering the nature of our predicted interaction effect. The main effect of order of information at attitude formation found in Study 1 was not replicated in Study 2.

The interaction between order of information at attitude formation and order of information at persuasion was also nonsignificant, F(1, 213) = .376, p = .540, η_p^2 = .002; participants in matching conditions of order of information did not display significantly more attitude change compared to participants in mismatching conditions.

Expectation/Preference Effect

As in Study 1, I conducted four independent samples *t*-tests comparing participant scores for Interest, Preference, Expectation, and the aggregate of the previous three measures across conditions of order of information at attitude formation (simple/complex vs. complex/simple). Once again, I predicted higher scores of these measures in simple/complex conditions (denoting more interest in Sarah's morals, ethics, and physical appearance), demonstrating preference/expectancy of information more recently presented compared to participants in complex/simple conditions. None of these analyses revealed a significant difference.

Means associated for each measure as well as the aggregate index are all presented in Table 2. Overall, measures of participant interest, preference, and expectation all failed to produce a significant effect across conditions of order of information at attitude formation. The aggregate index of interest, preference, and expectation also failed to produce a significant effect. However, in this instance the observed mean differences all trended in same direction of what I predicted based on what was previously found by Pupco (2018). In other words, although nonsignificant, participants in the complex/simple condition showed a weak tendency to express more interest, preference, and expectation for subsequent information pertaining to more simple information about Sarah's popularity.

Table 2

Study 2 Expectation/Preference Scores Across Conditions of Order at Attitude Formation

	Simple/Complex Mean (*SD*)	Complex/Simple Mean (*SD*)	*t*(216)	*p*
Interest	5.1 (1.7)	4.9 (1.5)	.70	.486
Preference	5.3 (1.7)	5.1 (1.9)	.94	.346
Expectation	4.6 (1.8)	4.2 (2.0)	1.70	.090
Aggregate	5.0 (1.3)	4.7 (1.3)	1.56	.120

Note. Comparison of mean expectation/preference scores for participants across conditions of order at formation, with *t*-values for reference.

Thought Favorability

Thought listings were coded into two different response indices: an index of thought favorability (average valence of relevant thoughts) and an index of relevant thoughts (average number of relevant thoughts per participant). I conducted a 2 (order of information at attitude formation) x 2 (order of information at persuasion) analysis of variance (ANOVA) framing index of thought favorability as the dependent variable to examine the interaction across conditions. Recall our original predictions for Study 2 that matching order conditions are less conducive to counterarguing; Considering this prediction while bearing in mind that the persuasive messages are negative in nature and negative thoughts would indicate acceptance of the message, I predicted a more negative thought favorability in matching order conditions. I also predicted higher amounts of relevant thoughts in matching conditions compared to mismatching conditions for reasons stated in Study 1.

I found no significant main effects of order at attitude formation or persuasion($F(1, 212) = .614$, $p = .434$, $\eta_p^2 = .003$ and $F(1, 212) = .98$, $p = .323$, $\eta_p^2 = .005$, respectively). The interaction between order at attitude formation and persuasion was significant, $F(1, 212) = 1.51$,

p = .035, η_p^2 = .021; as plotted in Figure 1, thought favorability in matching order conditions (M = .01, SE = .71 and M = .01, SE = .71 for matching simple/complex and complex/simple, respectively) was significantly higher than in mismatching order conditions (M = -.09, SE = .71 and M = -.21, SE = .71 for simple/complex formation and complex/simple persuasion and the reverse, respectively). This is directly opposite to our predictions, as participants in matching conditions seemed to list more positive favorable thoughts about Sarah, implying more counterarguing in those conditions.

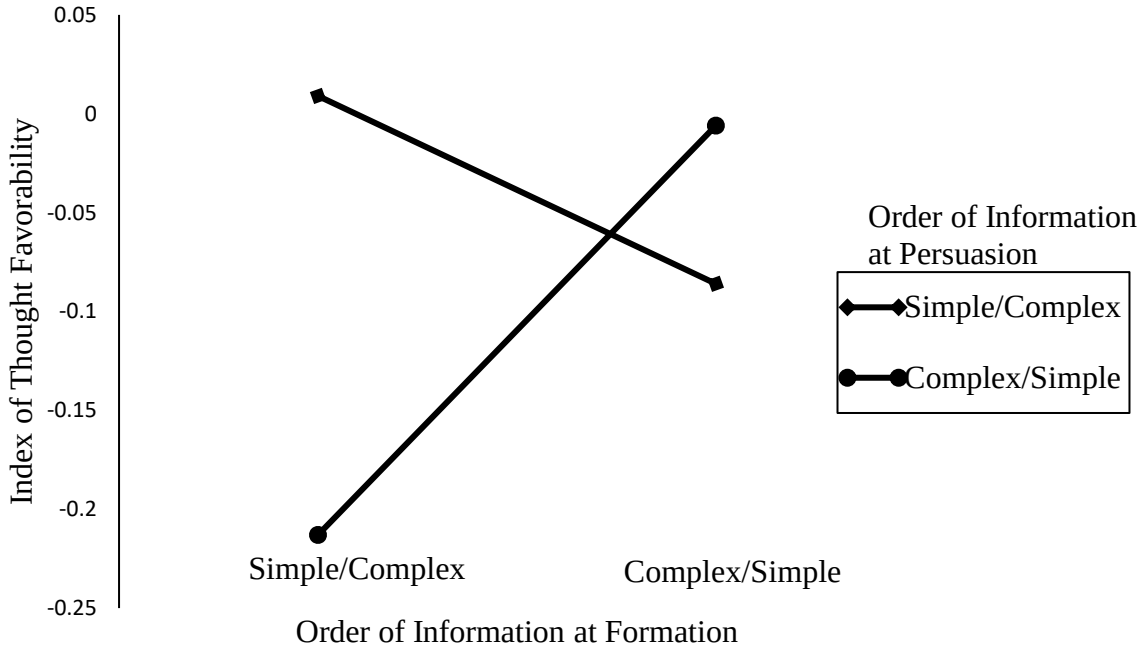

Figure 1. *Thought favorability as a function of order of information at attitude formation and persuasion phases.*

Amount of Issue-Relevant Thinking

I conducted a second 2x2 ANOVA framing index of thought relevance as the dependent variable across matching and mismatching conditions to determine matching order conditions

may promote increased thought generation about Sarah. Once again, there were no main effects of order of information at attitude formation or persuasion conditions ($F(1, 214) = .00$, $p = .998$, $\eta_p^2 < .001$ and $F(1, 214) = .05$, $p = .815$, $\eta_p^2 < .001$, respectively). This was expected given the nature of the predicted interaction. The interaction between order of information conditions was also nonsignificant, $F(1, 214) = 1.61$, $p = .205$, $\eta_p^2 = .007$. Participants in matching order conditions did not report significantly more relevant thoughts ($M = 3.5$, $SE = .31$ and $M = .3.6$, $SE = .31$ for matching simple/complex and complex/simple, respectively) compared to those in mismatching order conditions ($M = 3.9$, $SE = .32$ and $M = 4.0$, $SE = .32$ for simple/complex formation and complex/simple persuasion and the reverse, respectively). Indeed, this trended in the opposite direction of what was predicted.

Discussion

Overall, Study 2 did not present results aligned with what I predicted. While I confirmed that our persuasion manipulation was effective and that attitudes did not significantly differ based on the order of information presented at attitude formation alone, I found no evidence of the classic order persuasion matching effect. Furthermore, measures of interest, preference, and expectation of the type of information pertaining to Sarah did not yield significant findings, though patterns did trend toward predicted results. Finally, analyses of thought listings revealed a significant effect opposite to what I initially predicted; participants in matching conditions displayed more favorable thoughts toward Sarah compared to those in mismatching conditions. Implications for these results are elaborated upon in the main discussion section.

Chapter 4: General Discussion

In brief summary, the results of Studies 1 and 2 failed to display any significant predicted patterns of effects. I found no evidence of a consistent order matching persuasion effect for attitude measure reports in both studies, with the only significant effect being a main effect of order of information at formation on persuasion in Study 1, which was subsequently not replicated in Study 2. All analyses on thought listings were similarly nonsignificant with no interactions or main effects supporting predictions, and one significant finding in Study 2 that directly contradicted my predictions. Finally, there was no evidence for significant replication of expectation/preference effects from Pupco (2018), with data trending in the opposite direction of what was predicted in Study 1 and weakly trending (nonsignificantly) in the predicted direction in Study 2.

Implications

Ultimately, the question of why none of the hypothesized effects were observed must be raised. Despite clear evidence of the order persuasion matching effect across multiple studies in the past (Edwards, 1990; Edwards & Von Hippel, 1995; Fabrigar, 1995; Turner, 2004; Pupco, 2018), the present study did not corroborate any of these findings. There are a number of possible reasons for this failure to replicate, which the present section will cover. The first and broadest interpretation is that of a global Type I error, whereby the order persuasion matching effect as a phenomenon is illusory.

Global Type I error of the Order Persuasion Matching Effect

The utter absence of any effect of order of information in the present studies (despite employing sample sizes larger than any previous published study on matching effects) merits a re-exploration of the validity of the order persuasion matching effect as a whole. To date, the

number of recorded studies that I could find on order matching effects has been low. In terms of published articles, there are two studies conducted by Edwards in 1990 and two studies conducted by Edwards & Von Hippel in 1995. Furthermore, the effect was significantly replicated by Fabrigar (1995) in an unpublished dissertation study, and by Turner (2004) and in an unpublished honors thesis. These studies recorded the same effect, all trending very similarly. Including Pupco's nonsignificant effect (albeit trending in the expected direction) the two current studies and one additional file drawer study not reported in this thesis, there are a total of ten studies: seven with effects trending in the same direction and three nonsignificant studies that do not trend meaningfully in any direction. A meta-analysis of these ten studies in a fixed-effect model produced a null finding for the overall effect, Hedges' $g < .001$, $p = .675$. The three most recent studies comprised 98.8% of the weight of this analysis, largely due to their comparatively large sample size (the total sample size of the most recent three studies is 1271, compared to the total sample size of 795 combining all previous studies). A test of heterogeneity of effect size across studies was nonsignificant, $Q(9) = 14.29$, $p = .112$, although it is worth noting that this test is underpowered due to the low number of studies. Thus, differences in methodology still may change how one might interpret this meta-analysis, which will be discussed more closely in the following section.

Another argument supporting the global Type I error interpretation can be made when examining the literature behind the order persuasion matching effect; it is immediately apparent that there is a low quantity of studies examining this effect. One possible reason for the low quantity of publications is that researchers have indeed attempted to replicate this effect and failed, thus producing a large file drawer for this effect that cannot be recorded due to a publication bias for significant results. This effect has a total of two articles that have actually

been published in journals (Edwards, 1990; Edwards & Von Hippel, 1995), which alludes to the notion that either the effect has a very low rate of demonstration in labs or that the effect is overall understudied. One could point out that the order persuasion matching effect is a relatively understudied and not well known effect in the literature, and that this could have led to many researchers simply being unaware of it and not conducting research. However, Edwards' (1990) first article demonstrating this effect was considered pioneering evidence for affective/cognitive matching, and received widespread attention, as evidenced by almost 800 citations on Google Scholar. It is apparent that at the very least, the studies demonstrating this effect are not obscure, and continue to receive attention to this day.

The nonsignificant meta-analysis and the lack of publications demonstrating this effect are both plausible arguments that the order persuasion matching effect is as a whole illusory and should not be discounted when interpreting the results of the present studies. However, a closer examination of current and previous studies does give rise to alternative interpretations to global Type I error.

Non-Global/Localized Type I error

The three most recent studies differ from prior research in two notable ways. The first is sample size; the total subject count of these studies is already greater than the total of all participants recruited in previous studies. One might be tempted to argue that it is precisely due to the high power of these studies that a true null is revealed. However, that is confounded with the fact that all three studies employed the same paradigm using Sarah materials (henceforth referred to as the Sarah paradigm). In contrast, the majority of previous studies did not employ the Sarah paradigm. From this, one could speculate that it is not the overall effect that is illusory, but rather that the Sarah paradigm is an ineffective means of creating an order persuasion

matching effect. Recall that the Sarah paradigm was first put into use by Turner (2004) who sought to replicate the order persuasion matching effect without use of the affective/cognitive distinction. Since then, it has been employed once by Pupco (2018) and by the present studies. Turner (2004) observed a significant interaction between order of information at formation and persuasion with a *p*-value of .01, $\eta_p^2 = .054$. Pupco's (2018) replication of the Sarah paradigm did not produce a significant interaction, presenting a *p*-value of .154, $\eta_p^2 = .009$. While the interaction did not reach significance and the effect size recorded was smaller compared to that reported by Turner (2004), the effect still trended in the same direction; participants in matching conditions exhibited more attitude change than those in mismatching conditions. Finally, the present studies displayed trends, *p*-values, and effect sizes that could not be considered representative of an order persuasion matching effect (Study 1: $p = .854$, $\eta_p^2 = .001$; Study 2: $p = .540$, $\eta_p^2 = .002$; file drawer study: $p = .915$, $\eta_p^2 < .001$). Including a file drawer study (equally nonsignificant) that was not discussed in this thesis, the present studies included a total of 1271 participants, making it the highest powered study of the Sarah paradigm. To compare, Turner (2004) recruited 120 participants, whereas Pupco (2018) recruited 260 participants.

Indeed, a subgroup analysis on the previous meta-analysis partitioning the five studies that used the Sarah paradigm and the five that used different paradigms presented a significant difference across subgroups, $Q(1) = 9.88$, $p < .001$. The five studies using the Sarah paradigm produced a null effect (Hedges' $g < .001$, $p = .794$) whereas the five studies that used other paradigms presented a significant overall effect (Hedges' $g = .069$, $p = .001$). This result provides preliminary evidence that the issue of validity may be localized to the Sarah paradigm. Although all previous findings for the order persuasion matching effect may have been Type I error, it is also possible that Turner's (2004) first demonstration of the Sarah paradigm was a

Type I error, and that subsequent studies exploring this method are demonstrating a true null effect. This possibility raises the question of what it is about the Sarah paradigm that distinguishes it from previous studies examining the order persuasion matching effect, which are presumably valid.

When I compare the Sarah paradigm to most previous studies, there are three differences that stand out. The first, more obvious difference is that all previous studies employed both affective and cognitive information sets, whereas the Sarah paradigm used only cognitive information. Based on this distinction, one may observe the nonsignificant overall effect of the Sarah paradigm and conclude that the affect/cognition distinction is in fact integral to the order persuasion matching effect. However, this interpretation retains its previously discussed inconsistencies, namely that the affective/cognitive structure of participant attitudes does not vary as a function of which type of information is presented first (Fabrigar, 1995).

The second difference is that the attitude object of the Sarah Paradigm is a person as opposed to something less inherently complex such as a beverage or an ideograph. As such, it is possible that participants making judgements about Sarah may be drawing from a much richer experiential set that may cause them to process persuasive information about her differently. However, a previous study by Edwards and Von Hippel (1995) has used a person as an attitude object before and produced the effect; in addition, it is not immediately clear how the fact that a person as an attitude object would attenuate an effect of information order. Thus, further exploratory studies of attitude objects and how they may affect the order persuasion matching effect are required before a theoretical reason for a reduced effect can be generated.

The third possibility concerns the distinction of *modality.* Recall that the Sarah paradigm manipulates the order of information on a gradient of complexity, such that participants either

receive simple information before complex, or vice versa. This manipulation used purely cognitive text passages, which is in contrast to past studies, which manipulated the order of information that was categorically distinct. For instance, Edwards' (1990) first study manipulated the order of an affective prime with a text passage in order to generate attitudes towards a Chinese ideograph. Similarly, Edwards' second beverage study changed the order of a sensory stimulus (either smell or taste) with that of a text passage. Edwards argued that the distinction between these sets of information conformed with the affective/cognitive distinction, but they also differed in *modality*, whereby participants received the information via different mediums. This distinction of modality is separate from the affective/cognitive distinction, as it is more concerned with how information is presented as opposed to the type of information. The distinction in modality of information in Edwards' studies is apparent; purely perceptual/sensory information (e.g.,tasting/smelling a beverage) is experienced differently compared to a text passage which is processed in a more abstract, linguistic way. These methods produced robust order persuasion matching effects. The Sarah paradigm, which used a more subtle information type manipulation of complexity, did not produce matching effects in the present studies. In light of the modality distinction between the Sarah paradigm and previous studies, one could speculate that being presented two sets of information via distinct mediums may encourage the information to be processed separately, thus producing attitudes that are more multidimensional and complex. In contrast, simpler attitudes are only based off of a single dimension of judgement, such as taking all of the passages in the Sarah paradigm as a single set of information about a person. This distinction between previous studies and the Sarah paradigm is relevant as it takes into consideration a general assumption about the order matching effect regarding *differentiation*.

Differentiation refers to the extent to which information is organized and segmented into various dimensions by a given person. Within the attitudes literature differentiation is often referred to in conjunction with *integration* (which refers to the extent to which distinct dimensions of information/evaluations are related or orthogonal), comprising the dimensions of attitude complexity (Scott, 1969). For instance, an individual could read about Sarah's popularity, work ethic, morals, and appearance and not form any specific opinion about her until they have finished reading all materials, at which point they would form a global judgement about her overall to base their attitudes on (e.g.,Sarah is good). Conversely, they could form a separate judgement for each passage or paragraph that they read and thus compartmentalize the information to a greater extent (e.g.,Sarah is popular, Sarah is hard working, Sarah is moral, Sarah is attractive). While the former example would be that of a relatively undifferentiated attitude, the latter would illustrate a more differentiated attitude. Attitude differentiation has previously been shown to predict various other properties of attitudes such as extremity (Judd & Lusk, 1984) and correlates with increased elaboration on a given task (Tetlock & Kim, 1987). Differentiation can be encouraged through presentation of information through separate modalities as it enables distinct judgements abouts separate segments of information to be made. Thus, the overall attitude is comprised of multiple dimensions and is more complex in nature. Ergo, people who differentiate their judgments possess more complex, multidimensional attitudes compared to people who do not and have a more unidimensional judgement. When given an attitude reporting measure such as what the present study used, it is not possible to infer the extent to which information is processed differentially simply from the attitude rating; a 7 rating from a 1 to 7 scale could come from either a global judgement or the amalgamation of multiple separate judgements.

The order matching effect innately assumes a certain compartmentalization of information as it is being processed; the fact that the information is processed in separate segments is integral to the entire effect. If the two sets of information presented are not treated as unique or distinct, then the order in which they are presented would not matter beyond concerns for serial positioning memory effect. Because the Sarah paradigm uses only visual text-based information, it is possible that this creates conditions where processing of the two sets of information as a single set is encouraged. As the difference in modality of sets of information is a key difference between the Sarah paradigm and past studies, using sets of information that are processed distinctly from one another may be important for encouraging attitude differentiation and thus creating sufficient conditions for an order matching effect to occur.

Although this distinction in methodology is certainly worth considering when debating the extent of Type I error, one must also consider the second point of lack of publications. Although it is impossible to determine the extent to which nonsignificant findings have been recorded and subsequently stored away, there is an alternative explanation for this which takes into account the level of recognition that Edwards' original studies received; simply put, future researchers accepted the affective/cognitive matching interpretation of Edwards' studies at face value and did not seek to replicate it because it appeared to make sense. Indeed, subsequent research has demonstrated evidence of affective/cognitive matching, whereby affective attitudes are more susceptible to affective messages, with a similar trend for the cognitive distinction (Aquino, Haddock, Maio, Wolf, & Alparone, 2016; Clarkson, Tormala, & Rucker, 2011; Fabrigar & Petty, 1999; See, Petty, & Fabrigar, 2008). As you can see, Edwards' studies appear to fit the narrative of attitudes literature. Another plausible reason why a researcher would want to replicate Edwards' studies would be for the methodology of producing affective and

cognitively based attitudes. However, alternative methods for measuring and creating affective/cognitive attitudes were subsequently developed and carried much less inferential ambiguity (e.g.,Aquino et al., 2016; Clarkson et al., 2011; Crites, Fabrigar, & Petty, 1994; Fabrigar & Petty, 1999; See, Petty, & Fabrigar, 2008). Taking all of this into consideration, the most plausible reason why a researcher would want to revisit these specific studies is if they took issue with original interpretations of said experiments. This, in turn, has been the exact reasoning for every known attempted replication of Edwards' 1990 studies (Fabrigar, 1995; Turner, 2004; Pupco, 2018), including the present studies. As most subsequent research would simply look at Edwards' studies as a valid demonstration of affective/cognitive matching and simply created less ambiguous methodologies to test it, there is a viable alternative explanation to the relative lack of replication Edwards' studies as opposed to a file drawer.

Overall, looking only at past literature, it would be hasty to conclude purely off of the present studies that the order persuasion matching effect doesn't exist at all. If a Type 1 error is in fact the explanation for these studies, it may be of a more localized nature, and reside solely within the Sarah paradigm. This, in turn, would lead to assuming that Turner's (2004) study (the only study that presented significant findings of all the Sarah paradigm studies) was a Type I error. Alternatively, perhaps the Sarah paradigm initially produced valid order matching effects with Turner, but that methodological changes in subsequent studies have attenuated the effect. Possible reasons for both interpretations are discussed below.

Decreasing Effectiveness of the Sarah Paradigm

An alternative interpretation to the idea that the Sarah paradigm is itself a Type I error is that while it was initially effective in producing order persuasion matching effects, subsequent modifications to the study have degraded its validity. As was previously discussed, Turner's

(2004) significant findings (p = .01, η_p^2 = .054) were followed up by Pupco's (2018) study (p = .154, η_p^2 = .009) and finally the present studies (Study 1: p = .854, η_p^2 = .001; Study 2: p = .540, η_p^2 = .002; file drawer study: p = .915, η_p^2 < .001). If one plotted the patterns of effects of studies across time, a trend where the effect sizes decrease and level out at zero would be observed. While, as previously stated, this could simply be interpreted as one Type I error based on a comparatively small sample size (Turner, 2004) and four true null findings (Pupco (2018), the two present studies, and one file drawer study), there have been recorded modifications to the Sarah paradigm from both Pupco (2018) and the present studies that may offer alternative interpretations.

It is important to note that despite all employing the Sarah paradigm, the studies by Turner (2004), Pupco (2018), and the present studies are not identical in terms of methodology or context. Turner's (2004) study was conducted entirely in-lab and via a paper-and-pencil medium, where participants read each passage about Sarah on separate pages. Turner also included a card-sorting task following the attitude formation phase but before the persuasion phase, where participants listed as many attributes that they felt pertained to Sarah as they could on separate cards and then grouped these cards based on common themes that the attributes revolved around (recall that complexity of attitudes was measured by recording the number of groups participants sorted the cards into, inferring that more groups means more dimensions of judgements regarding Sarah).

Pupco's (2018) use of the Sarah paradigm differs from Turner's (2004) in a number of ways. First, Pupco's study was conducted 14 years after Turner's; while I established that the participants did not report significant differences in attitude scores, there is no saying whether the underlying structure of said attitudes changed across studies. For instance, the complex

persuasive passage describes Sarah as unattractive due to being overweight and having crooked teeth; while this may have engendered a negative impression of Sarah in 2004, contemporary views of body shaming and the subjective nature of beauty may have led participants to be more likely to defend or favor Sarah in wake of such statements. Thus, the gradually decreasing relevance of materials to produce a desired negative view of Sarah may have contributed to the erosion of the order persuasion matching effect.

Furthermore, Pupco's (2018) study was not done in paper-and-pencil, but rather moved to an entirely digital setting whereby participants either completed the experiment in-lab on provided computers or at uncontrolled locations via online survey. This shift in how study materials were presented may have attenuated the order persuasion matching effect; the natural chunking of information in Turner's (2004) paper-and-pencil modality that had participants read Sarah passages on separate pages may have encouraged processing of these passages as separate and distinct sets of information, thus increasing likelihood of differentiation. In contrast, the flow of information on an in-lab computer or online survey (where the next passage was either on the same page as a different paragraph or simply required a click to proceed to the next page) may have been smoother from passage to passage, encouraging processing the information as a single entity. Finally, Pupco (2018) did not include the card-sorting task, but instead employed an expectations/preferences measure. The card-sorting task employed by Turner (2004) quite literally encouraged participants to compartmentalize their judgements about Sarah by separating them into distinct categories, which may have further accentuated the order persuasion matching effect. The fact that this task was not included in subsequent studies using the Sarah paradigm may have contributed to the erosion of the effect.

The present studies modified the Sarah paradigm further from Turner (2004) and Pupco (2018). In contrast to Pupco's (2018) in-lab and on-line data collection method, the present studies exclusively collected data online. Further removing participants from an in-lab setting may have further reduced the thoughtfulness or differentiation of attitudes as all data was now collected from uncontrolled settings that give rise to possible distractions or lack of motivation. Foreseeing this possibility, Pupco (2018) examied the in-lab and online samples of her study separately and found no significant differences in effects; thus, one could offer a counterargument that moving to a completely online setting would not significantly erode the order persuasion matching effect. However, it is important to note that these analyses divided a previously relatively low sample size (260 participants) into two separate groups (121 in-lab participants and 139 online participants), thus lowering the probability of detecting any significant differences. Otherwise, the present studies are not procedurally very different from Pupco's (2018), making it difficult to attribute the decline in effect size to methodology alone. An alternative possible explanation for this difference is that the participants in the present studies are somehow different from those recruited by Pupco. Recall that the present study was conducted two years after Pupco (2018). While one might initially dismiss this potential cohort effect given the relatively short time difference, this two year time period carries with it an important confound of increasing availability of online studies within the sample pool. While this approach was relatively novel as early as several years ago (or even in 2018, the time Pupco's study was conducted), it has now become so commonplace that some research labs at Queen's University have moved almost all of their research into an online setting using Qualtrics. As a result, a large portion of participants were receiving many (if not most, or even all) of their participation credits from online studies, at the time of the present studies. In contrast, online

studies made up a much smaller portion of available studies at the time of Pupco (2018). This bears asking the question of whether online tasks are being treated differently from in-lab tasks, or whether participants are no longer focusing on the task at hand now that the online approach has become more commonplace. Perhaps online studies are treated like other Internet activities these days, accompanied by multitasking and distractions that may attenuate more subtle effects such as the order persuasion matching effect. As such, it is possible that subsequent studies on the order persuasion matching effect in a digital or online environment would need to further encourage the compartmentalization of information (and subsequent attitude differentiation) beyond what might have been necessary for paper-and-pencil renditions of the same paradigm. However, pending any formal comparison of datasets, we cannot at this point make any strong claims that there was an erosion of attentiveness across studies. It is important to note that these interpretations are purely post hoc speculations and require further analysis to verify.

A final noteworthy trend in how the Sarah paradigm was conducted from 2004 to the present was the extent to which participants completed other studies in conjunction with those experiments exploring the order persuasion matching effect. Turner's (2004) study took substantially longer to complete (given the paper/pencil medium as well as the lengthly card-sorting task) and was thus only packaged with one or two additional studies. Conversely, Pupco's (2018) online study was completed as the third of three studies in an online package. Finally, the present studies were completed as the seventh of seven to eight studies in an online package. Examining this pattern, there is clearly a trend where the more studies the Sarah Paradigm experiment is packaged with, the more the effect seems to attenuate. One could reason that one of the factors driving the erosion of this effect is participants being less able or motivated to process information in a manner that would produce a robust order persuasion

matching effect. While this pattern of increased packaging fits logically with the trend of decreasing effect sizes, further comparisons across datasets would be required to substantiate them as more than speculation.

When examining the changes made to the Sarah paradigm over the years, it is possible to speculate that Turner's (2004) methodology was perhaps the optimal form of the Sarah paradigm, and produced a robust and significant order persuasion matching effect. Pupco's (2018) modifications to the methodology somewhat eroded the effect, but still produced a comparable trend. Finally, the present studies were conducted in the context of a notably different subject pool, and the effect was entirely absent. While no one of the differences between Turner's and subsequent studies (the generational gap, moving to a digital/online medium, removing the card-sorting task, and including an expectations/preferences measure) may have singlehandedly eroded the effect, it is possible that the combination of all of these differences was enough to remove all traces of the effect from the Sarah paradigm. Supporting this, a subgroup analysis of the previous meta-analysis partitioning the three present studies and the seven past studies revealed a significant difference across subgroups, $Q(1) = 6.79$, $p = .009$; the three present studies produced a null effect (Hedges' $g < .001$, $p = .881$) whereas the seven prior studies presented a significant overall effect (Hedges' $g = .043$, $p = .008$).

Taking all of these possibilities into account, many variables need to be considered when interpreting the pattern of results from the present studies. First and foremost, the order persuasion matching effect may not actually exist; the present studies employed more participants than all past studies combined and returned with null results, which completely invalidated the effect in a meta-analysis. However, key theoretical distinctions between the Sarah paradigm and methods of past studies cannot be ignored in terms of how they might have

attenuated an order persuasion matching effect, and until they are examined in further empirical detail it would be hasty to write off the effect as a whole. Assuming that the overall effect is not null, the Sarah paradigm could either be interpreted either as an invalid means of producing an order persuasion matching effect or could be observed to have degraded following modifications to methodology and data collection methods. All of these possibilities merit further exploration in future studies.

Future Directions

Future research should focus on three primary goals. Firstly, the replication of the original order persuasion matching effect should be established to verify the integrity of the effect and whether it merits future study at all. This replication can be accomplished through two means: replicating the effect using a published method previously found to produce the effect, or by creating a new conceptual replication that addresses the limitations of the Sarah paradigm previously discussed. The initial step should be to focus on the replication of the Sarah paradigm, as replicating an order persuasion matching effect using this paradigm would both validate the notion that the effect is not a global Type I error and would serve to avoid the original interpretations of the effect being due to affective/cognitive matching. Assuming that the existence of the order persuasion matching effect as well as the validity of the Sarah paradigm, a pure replication of Turner's (2004) Sarah paradigm should be conducted. As Turner's method was the only one to create a significant effect, it is imperative to re-establish that the specific materials and methods can produce an order persuasion matching effect before any attempts to improve this paradigm are made (otherwise, it would be difficult to tell whether the overall paradigm or the modifications are what is nullifying the order persuasion matching effect). If the subsequent replication of Turner's (2004) methodology is nonsignificant, it may be necessary to

revert back to previous methods such as those used by Edwards (1990) to verify whether this null effect is global or localized to the Sarah paradigm.

Finally, should the original Sarah paradigm produce an order persuasion matching effect, efforts should be made to investigate further into what exactly enhances or attenuates this effect. Previous discussion on the modality distinction of information and how it could encourage differentiation should be addressed here, and will simultaneously serve to improve future methodology in eliciting an order persuasion matching effect while improving our understanding of its underlying mechanics as a function of attitude formation and persuasion. A possible modification to the Sarah paradigm that might encourage differentiation would be having participants complete a rating scale following each passage about Sarah asking them to rate her on each given attribute (for instance, following the simple passage a participant would be asked "how popular do you think Sarah is?" and would report this on a scale from 1 to 7). Doing this following each passage would both encourage participants to think about separate attributes of Sarah as well as contemplate the attitude object in a more thoughtful manner overall, which have both been speculated to factor into the order persuasion matching effect. Another possibility in modifying the Sarah paradigm is exploring different modalities of information while keeping the nature of said information purely cognitive. For example, having participants listen to an audio recording of one passage while reading the other and manipulating the order in which these modalities are used. This would effectively enhance the distinction between the two sets of information independent of an affective/cognitive distinction. In light of the possibility that presenting this information digitally might be reducing processing or differentiation, it is important to explore additional methods that may address this potential methodological disadvantage. One could imagine implementing a "supercharged" manipulation of the Sarah

paradigm where all of the previously suggested changes are implemented in order to maximize differentiation, and observing whether the order persuasion matching effect reoccurs, or perhaps displays an even stronger effect than Turner's (2004) initial findings.

Assuming that the suggested future studies do present the expected findings, this would set groundwork for future studies that explore the mechanics underlying the order persuasion matching effect to a greater extent. If the extent of attitude differentiation is truly a moderator of the effect, then research could examine whether individual differences in propensity to segment information could predict the strength of order manipulations. For instance, people who are more motivated to think deeply about information (need for cognition) may also compartmentalize information to a greater degree, and thus one might predict that people from a high need for cognition population might be more susceptible to the order persuasion matching effect.

Conclusions

One might be tempted to dismiss the proposed future directions as micro-level research that only seeks to see whether the Sarah paradigm works as intended. Indeed, one might ask why research into the Sarah paradigm or the order persuasion matching effect as a whole is important. To this end, it is important to consider the original goal of the present studies: further examining the underlying mechanisms of the order persuasion matching effect. The effect was initially interpreted to be due to affective/cognitive matching (Edwards, 1990). This interpretation went unchallenged until Fabrigar (1995) found evidence against it but did not find conclusive evidence of what the underlying mechanism could actually be. Subsequent studies by Turner (2004) and Pupco (2018) attempted to further investigate what could be driving the order persuasion matching effect, if not affective/cognitive matching. At the time of the present study, there is still relatively little insight into the underlying mechanisms driving increased persuasion

in matching conditions. If it's not affective/cognitive matching, then it is a mechanism that has a clear and significant influence on attitude change but is as of yet unstudied. By validating the Sarah paradigm through the proposed modifications, it is possible to see whether compartmentalization is an important moderator in the order persuasion matching effect. By extension, this would demonstrate an underlying mechanism of the effect and finally provide insight into what is driving it.

In order to understand the significance and importance of the order persuasion matching effect, it is important to revisit the first demonstration of the effect by Edwards (1990). Recall that the original effect was interpreted as affective/cognitive matching and that this interpretation went relatively unchallenged. Edwards (1990) studies are largely cited as the first published evidence of affective/cognitive matching and continue to be treated as such by contemporary research and reviews. There is little question that affective/cognitive matching is a valid effect; it has received support from multiple studies using different methodologies over the years. However, the literature reviewed by the present research provides solid evidence that Edwards' (1990) study did not present a demonstration of affective/cognitive matching, but of a separate effect entirely. Thus, establishing the order persuasion matching effect as distinct from affective/cognitive matching effects would serve as an important correction to the attitudes literature.

Having made this distinction clear, it becomes imperative to learn more about what exactly the order persuasion matching effect is, especially considering its relative neglect from a conceptual perspective; attitudes and persuasion researchers are most concerned with what the specific *content* of a message is when gauging how it will affect one's attitudes or behavior. This is doubly the case for topics such as the affective/cognitive distinction, where categorically

different information can elicit structural differences in said attitudes. However, attitudes research has sorely neglected the importance of the *sequencing* of the information within a message and how it may affect persuasion. This previously unexplored area of attitudes research is addressed by the order persuasion matching effect and brings with it both practical and theoretical insights into attitudes research. It is no exaggeration to say that research examining the order persuasion matching effect could introduce a new dimension to consider when designing persuasive messages.

That said, the present findings were certainly counter to what was originally hypothesized and threaten the validity of the order persuasion matching effect as a whole. However, these results also prompted a closer examination into the methodologies and distinctions of present and past studies and gave rise to new possibilities to explore. It will be interesting to observe how future research serves to elucidate which of the three possible interpretations of the patterns of data is the most likely.

References

Aquino, A., Haddock, G., Maio, G. R., Wolf, L. J., & Alparone, F. R. (2016). The Role of Affective and Cognitive Individual Differences in Social Perception. *Personality and Social Psychology Bulletin*. https://doi.org/10.1177/0146167216643936

Baker, S. M., & Petty, R. E. (1994). Majority and Minority Influence: Source-Position Imbalance as a Determinant of Message Scrutiny. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/0022-3514.67.1.5

Breckler, S. J. (1984). Empirical validation of affect, behaviour, and cognition as distinct components of attitude. *Journal of Personality and Social Psychology, 47*(6), 12-30.

Brodie, D. A., & Murdock, B. B. (1977). Effect of presentation time on nominal and functional serial-position curves of free recall. *Journal of Verbal Learning and Verbal Behavior*. https://doi.org/10.1016/S0022-5371(77)80046-7

Clarkson, J. J., Tormala, Z. L., & Rucker, D. D. (2011). Cognitive and affective matching effects in persuasion: An amplification perspective. *Personality and Social Psychology Bulletin*. https://doi.org/10.1177/0146167211413394

Crites, S. L. Jr., Fabrigar, L. R., & Petty, R. E. (1994). Measuring the affective and cognitive properties of attitudes: conceptual and methodological issues. *Personality and Social Psychology Bulletin, 20*(6), 619-634.

Edwards, K. (1990). The interplay of affect and cognition in attitude formation and change. *Journal of Personality and Social Psychology*, *59*(2), 202-216.

Edwards, K. (1992). The primacy of affect in attitude formation and change: restoring the integrity of affect in the tripartite model. Unpublished manuscript, University of Michigan.

Edwards, K., & von Hippel, W. (1995). Hearts and minds: the priority of affective versus cognitive factors in person perception. *Personality and Social Psychology Bulletin*, *21*(10), 996-1011.

Fabrigar, L. R. (1995). *The role of the affective and cognitive bases of attitudes in susceptibility to affectively and cognitively based persuasion*. Unpublished manuscript, Ohio State University.

Fabrigar, L. R., MacDonald, T. K., & Wegener, D. T. (2005). The Structure of Attitudes. In Albarracín, D., Johnson, B. T., & Zanna, M. P. (Eds.), *The handbook of attitudes.* (pp. 79-125). Psychology Press.

Fabrigar, L. R., & Petty, R. E. (1999). The role of the affective and cognitive bases of attitudes in susceptibility to affectively and cognitively based persuasion. *Personality and Social Psychology Bulletin, 25*(3), 363-381.

Glanzer, M., & Cunitz, A. R. (1966). Two storage mechanisms in free recall. *Journal of Verbal Learning and Verbal Behavior, 5*, 351-360.

Huskinson, T. L. H., & Haddock, G. (2004). Individual differences in attitude structure: Variance in chronic reliance on affective and cognitive information. *Journal of Experimental Social Psychology, 40,* 82–90.

Insko, C. A., & Schopler, J. (1967). Triadic Consistency: A statement of affective-cognitive-conative consistency. *Psychological Review*, *74*(5), 361–376. https://doi.org/10.1037/h0020278

Judd, C. M., & Lusk, C. M. (1984). Knowledge structures and evaluative judgments: Effects of structural variables on judgmental extremity. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/0022-3514.46.6.1193

Katz, D., & Stotland, E. (1959). *A preliminary statement to a theory of attitude structure and change*. In S. Koch (Ed.), Psychology: a study of Science (Vol. 3). New York: McGraw-Hill.

Maheswaran, D., & Chaiken, S. (1991). Promoting Systematic Processing in Low-Motivation Settings: Effect of Incongruent Information on Processing and Judgment. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/0022-3514.61.1.13

Ostrom, T. M. (1969). The relationship between the affective, behavioral, and cognitive components of attitude. *Journal of Experimental Social Psychology*, *5*(1), 1-30

Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/0022-3514.46.1.69

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. *Advances in Experimental Social Psychology*. https://doi.org/10.1016/S0065-2601(08)60214-2

Petty, R. E., Fleming, M. A., Priester, J. R., & Feinstein, A. H. (2001). Individual versus group interest violation: Surprise as a determinant of argument scrutiny and persuasion. *Social Cognition*. https://doi.org/10.1521/soco.19.4.418.20758

Petty, R. E., & Wegener, D. T. (1998). Attitude change: Multiple roles for persuasion variables. In *The handbook of social psychology*. https://doi.org/10.1017/CBO9781107415324.004

Plato. (2011). 246a - 254e. In *Phaedrus*. Cambridge: Cambridge University Press. (Original work published ca. 370 B.C.E.)

Pupco, S. (2018). *An examination of the psychological mechanisms responsible for the order of information matching persuasion effect* (Unpublished honours thesis). Queen's University, Kingston, ON.

Scott, W. A. (1969). Structure of natural cognitions. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/h0027734

See, Y. H. M., Petty, R. E., & Fabrigar, L. R. (2008). Affective and cognitive meta-bases of attitudes: Unique effects on information interest and persuasion. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/0022-3514.94.6.938

See, Y. H. M., Petty, R. E., & Fabrigar, L. R. (2013). Affective-cognitive meta-bases versus structural bases of attitudes predict processing interest versus efficiency. *Personality and Social Psychology Bulletin*. https://doi.org/10.1177/0146167213490807

Tetlock, P. E. (1989). Structure and function in political belief systems. In *Attitude structure and function*.

Tetlock, P. E., & Kim, J. I. (1987). Accountability and Judgment Processes in a Personality Prediction Task. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/0022-3514.52.4.700

Turner, C. E. (2004). *An examination of the psychological mechanisms underlying the information order matching persuasion effect* (Unpublished honours thesis). Queen's University, Kingston, ON.

Zajonc, R. B. (1960). The process of cognitive tuning in communication. *Journal of Abnormal and Social Psychology, 61*, 159-167.

Zajonc, R. B, & Markus, H. (1982). Affective and cognitive factors in preferences. *Journal of Consumer Research*, 9,123-13

Appendix A: Study 1 Ethics Materials

PERSON: Letter of Information

Charlie Shen is conducting this study as part of a research project led by Dr. Leandre Fabrigar, a Professor of Psychology at Queen's University in Kingston.

We invite you to participate in a study, in which you will be asked to read a series of passages, and answer a couple of questionnaires about a person. We estimate that this experimental session, which includes this study and other short studies, will take approximately one hour to complete. This project does not involve any direct benefits. There are no known physical, psychological, economic, or social risks associated with the experiment.

Although we would appreciate it if you responded to all the material, please do not feel obliged to answer any material you find objectionable, or that makes you feel uncomfortable. Your participation in this study is voluntary and you may withdraw at any time during the experiment without penalty. To withdraw from the study, please exit the browser window (if online), or let the experimenter know. Upon completion of the study, withdrawal will not be possible as your responses are anonymous.

Your responses will remain anonymous. Only authorized researchers will have access to the data. The data from this project will be stored indefinitely, and may be provided to other authorized researchers upon request. There will be no identifying information that will connect you to your responses. The results of this study will only be published and/or presented in summary form in standard academic outlets. Individual confidentiality will not be breached. If you are interested, you are entitled to a copy of the findings.

In exchange for your participation you will be awarded 1.0 credits towards the final grade of your PSYC 100 course, or with $5.00 if you have arranged to be compensated monetarily.

Any questions about the study and your participation in it may be directed to Dr. Leandre Fabrigar at fabrigar@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at 1-844-535-2988 or chair.GREB@queensu.ca Again, thank you. Your interest in participating in this research study is greatly appreciated.

Dr. Leandre Fabrigar
Professor

Minqian (Charlie) Shen
MSc-2 Psychology Graduate Student

By checking below, I indicate that:

1. I have read the Letter of Information.

2. I understand that I will be participating in the study called PERSON. I understand that this means that I will be asked to read a series of passages and answer a couple of questionnaires about a person.

3. I understand that my participation in this study is voluntary and that I may withdraw at any time, up until the completion of the study, without penalty.

4. I understand that every effort will be made to maintain the confidentiality of the data, now and in the future. Only authorized researchers will have access to the data.

5. I have had all my questions answered to my satisfaction.

6. I am aware that I am entitled to a de-briefing upon my completion of the study. If I have any questions, concerns or complaints, I realize that they can be addressed to Dr. Leandre Fabrigar (fabrigar@queensu.ca) or the Chair of the General Research Ethics Board at 1-844-535-2988 or chair.GREB@queensu.ca.

If you do not consent to participate in this study, please exit the window, or let the experimenter know.

Debriefing Form

Charlie Shen is conducting this study as part of a research project led by Dr. Leandre Fabrigar, a Professor of Psychology at Queen's University in Kingston.

The study in which you participated examines the mechanism by which the order of information matching persuasion effect occurs. The order of information matching persuasion effect suggests that persuasion is greater when the order of information provided at persuasion, matches the order of information provided at attitude formation. Turner (2004) suggests that effect may occur due to a violation of the preference of the order in which information is presented. Once information is received a certain way, later information about the same thing may be preferred to be received in the same manner. Receiving information in a different order may confuse us, and result in an inability to focus on the information provided during persuasion.

To test this, half of the participants in the study received a passage pertaining to a fictitious person's popularity first, while the other half received a passage pertaining to their work ethic, morals and values, and appearance first. The attitude created by the passages was measured using the Overall Attitude Scale (Crites, Fabrigar, & Petty, 1994). After completing the attitude measure, half of the participants were asked what they want to know more about, providing us with a measure of their preference, so that we could determine whether preference influences the order of information matching persuasion effect.

Participants from each condition were assigned to receive additional negative information about Sarah, either in the same or opposite order that they initially received during the first part of the experiment (attitude formation). Finally, to measure how much attitude changed, participants completed the Overall Attitude Scale again (Crites, Fabrigar, & Petty, 1994). It is hypothesized that preference will have an influence on the order of information matching persuasion effect.

This is an on-going research project: please do not discuss this project with anyone, as knowledge of what we are trying to find may alter the results we obtain. Thank you.

If you would like to learn more about the broader topic of persuasion, the following reference may be of interest to you.

Cialdini, R.B. (2009). Influence: Science and practice. Pearson Education Inc.

In the event that you have any complaints, concerns, or questions about this research, please feel free to contact Dr. Leandre Fabrigar at 613 533-6492 or fabrigar@queensu.ca, or the General

Research Ethics Board at 1-844-535-2988 or chair.GREB@queensu.ca. We are required to keep track of adverse events that our research may relate to. In the unlikely event that such an event occurs and was not noted during the study, we encourage you to contact us or the GREB.

Thank you for your interest in participating in this research study, it is greatly appreciated.

Dr. Leandre Fabrigar

Professor

Minqian (Charlie) Shen

MSc-2 Psychology Graduate Student

Appendix B: Study 1 Materials and Measures

Attitude Formation Passages

Simple

Many people like Sarah. She is quick to develop friendships with others and has many friends. Others get along with her very well because they think that she is a genuinely pleasant person. In fact, she rarely sits alone on her lunch breaks, receives numerous phone calls daily, and is always the first to be informed of any parties or gatherings that people arrange. She is a very agreeable person and no one has ever been involved in a confrontation with her.

Complex

Sarah's friends and family view her as having a good work ethic. She is always typing away at her computer and consistently getting tasks completed quickly. In fact, she is typically the first person to complete their task. She works very hard and displays excellent focus on her duties. Her boss typically gets her to train new employees because he hopes other employees will model their work behaviour from hers. Sarah is willing to work overtime and additional shifts when asked to do so.

Sarah displays strong morals and values. She sees herself as very well balanced; she attends church regularly and has strong ties to her family. She is very able to distinguish between right and wrong and good and bad. She adheres to conventionally accepted standards; in fact, she has never even received a speeding ticket. Sarah tells others that it is important to stand by what you believe in because it represents strong morals and values. Others describe Sarah as virtuous.

Sarah has many attractive features. She has a very attractive face, smooth flawless skin and beautiful sparkling blue eyes. Most men can't help but notice her. She shops at designer stores and is always wearing the latest fashions in clothing. She has long flowing hair that is a gorgeous natural blonde colour. She is described as having a beaming smile. When Sarah was a young girl she was in commercials and advertisements.

Persuasion Phase Passages

Strong Simple

People initially find Sarah likable, but in time change their opinion. Sarah is quick to develop artificial friendships and holds no long-lasting friendships. She is very argumentative and although she is not typically in any major confrontations with others, she is rarely on good terms with people and is usually ignored by them. She sits with random people to eat lunch without them inviting her to do so. She is always informed about what people are planning on doing in the days to come because she is constantly asking people about their plans but is still rarely invited to join in.

Strong Complex

Sarah's coworkers view her as having a bad work ethic. Sarah exerts effort and focus only on a select few tasks that she enjoys. She gets tasks completed quickly, however, she does not produce quality work. Her work is very inconsistent. Sarah tends to arrive to work late in the mornings and take extra long breaks throughout the day. She is often found socializing and gossiping with others. When she is typing away at the computer, she is usually checking her personal e-mail and playing solitaire as opposed to doing her work.

Although on the surface Sarah appears to have strong values, her adherence to these values is minute. She is very reckless and impulsive and therefore often seen as misguided. She can never make decisions, regardless of their relevance and importance. When Sarah is honest, her honesty is often interpreted as hurtful as opposed to helpful. She does attend church but she views it as a place to socialize. In fact, while she is at church, she is easily distracted, does not

pay attention and is even caught daydreaming and looking around at others. She often visits her family but the reason she does so is to get money from her father and have her mother cook and clean for her.

Although some of Sarah's features are viewed as attractive, others are not. She has a disproportional body and is overweight. The excess weight she carries has eliminated her womanly figure. She wears thick glasses that are very uncomplimentary to her face shape and the way she does her make-up is very outdated. Her hair is stringy and not very healthy looking. Although she wears designer clothing it is often uncoordinated and very tight. She does have a nice smile when her mouth is closed, but when it is opened you become very distracted by her crooked teeth.

Weak Simple

While most people find Sarah likable, one or two people have changed their opinion of her. Sarah develops friendships quickly, but a few of them have turned out to be superficial, not lasting long. While she is typically agreeable, Sarah has gotten into the occasional heated argument. In one case, an argument with her friend got so heated that they did not talk to each other for a few days. One time, she made someone uncomfortable by sitting down next to them to eat lunch without asking. Sarah enjoys being informed about events that those around her are planning, but isn't always invited to all of them.

Weak Complex

A few of Sarah's coworkers think her work ethic could be improved. While Sarah is typically hardworking, there are a few tasks at work that she does not enjoy and puts less effort into. She is very time efficient in completing assignments, but will sometimes make a mistake or two. Although usually punctual, Sarah has arrived to work late a couple of times. She can sometimes get carried away chatting with a coworker while taking her break and neglect her work. She checks her personal email at work a few times a day.

Although Sarah appears to have strong values, she can forget about them at times. Sometimes, when she's excited, she will make a decision without thinking it over. She likes to take some extra time making certain choices, such as what to order on a menu. Sarah's honesty can occasionally come off as a little blunt and harsh. Her devotion to her church is partly fueled by her desire to socialize. At times, she has spaced out and been distracted during church services. Sarah enjoys visiting her family regularly, but sometimes they pamper her by cooking and cleaning for her or giving her gifts.

Despite having a healthy and attractive figure to most, one of her classmates suggested that she lose some weight to look more feminine. She has a spare pair of glasses in case she forgets her usual pair at home, but they don't fit her face as well. Sarah does not always keep up with the latest makeup trends. She has to shampoo her hair often to keep it smooth, and occasionally she'll try on an outfit that not everyone likes. She wears transparent braces, which are sometimes visible when she smiles.

Attitude Measure

Below is a list of words that could be used to describe your overall evaluation of **Sarah**. If the word ***definitely*** describes your evaluation of **Sarah**, then circle the number 7. If you decide that the word does ***not at all*** describe your evaluation of **Sarah** then circle the number 1. Use the intermediate numbers between 1 and 7 to indicate responses between these two extremes. Work rapidly. Your first reaction is best. This task should only take a minute or two to complete. Please begin now.

Dislike

1 2 3 4 5 6 7

Not at all Totally

Good

1 2 3 4 5 6 7

Not at all Totally

Undesirable

1 2 3 4 5 6 7

Not at all Totally

Bad

1 2 3 4 5 6 7

Not at all Totally

Like

1 2 3 4 5 6 7

Not at all Totally

Positive

1 2 3 4 5 6 7

	Not at all						Totally
Negative							
	1	2	3	4	5	6	7
	Not at all						Totally
Desirable							
	1	2	3	4	5	6	7
	Not at all						Totally

Expectation Measure

You have just read a passage about Sarah's popularity, and another passage about her work ethic, morals/values, and appearance. By selecting a number below, please indicate what about Sarah, you found the most interesting. If you found her popularity to be the most interesting, then select number 1. If you found her work ethic, morals/values, or appearance to be the most interesting then select number 7. Use the intermediate numbers between 1 to 7 to indicate responses between the two extremes.

	1	2	3	4	5	6	7
Popularity	Equally Interesting						Work ethic, values, appearance

If you were to be provided with more information about either Sarah's popularity, or about her work ethic, morals/values and appearance which information would you prefer to receive? If you would like to receive more information about her popularity, then select number 1. If you would like to receive more information about her work ethic, morals/values, and appearance, then select number 7. Use the intermediate numbers between 1 to 7 to indicate responses between the two extremes.

1 2 3 4 5 6 7

Popularity Equally Interesting Work ethic, values, appearance

You will now be presented with more information about Sarah. Select a number between 1 to 7 to indicate what information you expect to receive next. If you expect to receive more information about her popularity, then select number 1. If you expect to receive more information about her work ethic, morals/values, and appearance, then select number 7. Use the intermediate numbers between 1 to 7 to indicate responses between the two extremes.

1 2 3 4 5 6 7

Popularity Equally Interesting Work ethic, values, appearance

Thought Listing Task

You were recently presented with more information about Sarah. We are interested in the thoughts you may have experienced while reading. In the spaces provided, please list any thoughts you had ONLY while reading about the most recent set of passages about Sarah. If you have no more thoughts, simply type ‘none.’

Appendix C: Study 2 Materials and Measures

Attitude Formation Passages

Simple

Many people like Sarah. She is quick to develop friendships with others and has many friends. Others get along with her very well because they think that she is a genuinely pleasant person. In fact, she rarely sits alone on her lunch breaks, receives numerous phone calls daily, and is always the first to be informed of any parties or gatherings that people arrange. She is a very agreeable person and no one has ever been involved in a confrontation with her.

Complex

Sarah's friends and family view her as having a good work ethic. She is always typing away at her computer and consistently getting tasks completed quickly. In fact, she is typically the first person to complete their task. She works very hard and displays excellent focus on her duties. Her boss typically gets her to train new employees because he hopes other employees will model their work behaviour from hers. Sarah is willing to work overtime and additional shifts when asked to do so.

Sarah displays strong morals and values. She sees herself as very well balanced; she attends church regularly and has strong ties to her family. She is very able to distinguish between right and wrong and good and bad. She adheres to conventionally accepted standards; in fact, she has never even received a speeding ticket. Sarah tells others that it is important to stand by what you believe in because it represents strong morals and values. Others describe Sarah as virtuous.

Sarah has many attractive features. She has a very attractive face, smooth flawless skin and beautiful sparkling blue eyes. Most men can't help but notice her. She shops at designer stores and is always wearing the latest fashions in clothing. She has long flowing hair that is a gorgeous natural blonde colour. She is described as having a beaming smile. When Sarah was a young girl she was in commercials and advertisements.

Persuasion Phase Passages

Ambiguous Simple

While most people find Sarah likeable, there are some people who don't like her. While she makes friends quickly, she does not always maintain her friendships, and has lost some as a result. While she is typically agreeable, Sarah has had her share of confrontations and tends not to back down from conflict, which has led to some rocky relationships. On occasion, she has sat with people she didin't know at lunch without asking, which made them feel awkward. Sarah has been known to gatecrash parties she wasn't invited to, although people are usually fine with it.

Ambiguous Complex

Some of Sarah's coworkers have questioned her work ethic. While typically hardworking, Sarah is vocal about the tasks she does not enjoy and is prone to complaining. While she finishes work very quickly, she can on occasion overlook an error or two. Sarah has been late to work before, but she apologized and has resolved to be more punctual. Because she finishes her work quickly, Sarah can be prone to talking to her coworkers and distracting them from their work. She also takes time to check her phone and email between tasks.

While Sarah appears to have strong values, there have been times where she did not adhere to them. She has a history of doing and saying things impulsively without thinking about whether they are good or bad. She can be indecisive about important issues, and her honest opinions can sometimes lack tact and come off as hurtful. Her devotion to her church is mainly fueled by her desire to socialize and make friends., leading her to sometimes be distracted during services.

Sarah likes to slack off a little when she visits her family, as her parents will cook for her and help with her finances.

While her features are mostly considered attractive, others have been seen as less so. She is somewhat overweight and has a disproportional body. Some of her classmates remarked that she looks less feminine than her thinner friends. She has a spare pair of glasses in case she forgets her usual pair at home, but they are very large and conflict with her makeup. Her hair looks frizzled in the morning or when it's raining, and her choice of clothes don't always complement her body and can be uncomfortable. She has a nice smile when her mouth is closed, but her braces can be distracting when she opens it.

Attitude Measure

Below is a list of words that could be used to describe your overall evaluation of **Sarah**. If the word ***definitely*** describes your evaluation of **Sarah**, then circle the number 7. If you decide that the word does ***not at all*** describe your evaluation of **Sarah** then circle the number 1. Use the intermediate numbers between 1 and 7 to indicate responses between these two extremes. Work rapidly. Your first reaction is best. This task should only take a minute or two to complete. Please begin now.

Dislike

1 2 3 4 5 6 7

Not at all Totally

Good

1 2 3 4 5 6 7

Not at all Totally

Undesirable

1 2 3 4 5 6 7

Not at all Totally

Bad

1 2 3 4 5 6 7

Not at all Totally

Like

1 2 3 4 5 6 7

Not at all Totally

Positive

1 2 3 4 5 6 7

Not at all Totally

Negative

1 2 3 4 5 6 7

Not at all Totally

Desirable

1 2 3 4 5 6 7

Not at all Totally

Expectation Measure

You have just read a passage about Sarah's popularity, and another passage about her work ethic, morals/values, and appearance. By selecting a number below, please indicate what about Sarah, you found the most interesting. If you found her popularity to be the most interesting, then select number 1. If you found her work ethic, morals/values, or appearance to be the most interesting then select number 7. Use the intermediate numbers between 1 to 7 to indicate responses between the two extremes.

1 2 3 4 5 6 7

Popularity Equally Interesting Work ethic, values, appearance

If you were to be provided with more information about either Sarah's popularity, or about her work ethic, morals/values and appearance which information would you prefer to receive? If you would like to receive more information about her popularity, then select number 1. If you would like to receive more information about her work ethic, morals/values, and appearance, then select number 7. Use the intermediate numbers between 1 to 7 to indicate responses between the two extremes.

1 2 3 4 5 6 7

Popularity Equally Interesting Work ethic, values, appearance

You will now be presented with more information about Sarah. Select a number between 1 to 7 to indicate what information you expect to receive next. If you expect to receive more information about her popularity, then select number 1. If you expect to receive more information about her work ethic, morals/values, and appearance, then select number 7. Use the intermediate numbers between 1 to 7 to indicate responses between the two extremes.

1 2 3 4 5 6 7

Popularity Equally Interesting Work ethic, values, appearance

Thought Listing Task

You were recently presented with more information about Sarah. We are interested in the thoughts you may have experienced while reading. In the spaces provided, please list any thoughts you had ONLY while reading about the most recent set of passages about Sarah. If you have no more thoughts, simply type ‘none.’

Appendix D: Complete Source Tables of Analysis

Study 1

ANCOVA: 2 (Order at formation) x 2 (Order at Persuasion) x 2 (Argument Strength) framing attitude reports at Persuasion as the dependent variable

Source	Sum of Squares	df	Mean Square	*F*	*p*	Partial Eta Squared
Corrected Model	278.22	8	34.78	24.80	<.001	.302
Intercept	139.33	1	139.3	99.37	<.001	.178
T1 Attitude	.027	1	.027	.019	.891	<.001
Order at Formation	22.78	1	22.78	16.25	<.001	.034
Order at Persuasion	.007	1	.007	.005	.942	<.001
Argument Strength	264.73	1	264.73	188.8	<.001	.292
Order at Formation * Order at Persuasion	.099	1	.099	.070	.791	<.001
Order at Formation * Argument Strength	9.92	1	9.92	7.07	.008	.015
Order at Persuasion * Argument Strength	.326	1	.326	.233	.630	.001
Order at Formation * Order at Persuasion * Argument Strength	.048	1	.048	.034	.854	<.001
Error	642.22	458	1.40			
Total	9165.8	467				
Corrected Total	920.43	466				

ANCOVA: (Order at formation) x 2 (Order at Persuasion) x 2 (Argument Strength) framing thought favorability index as the dependent variable

Source	Sum of Squares	df	Mean Square	*F*	*p*	Partial Eta Squared
Corrected Model	34.80	7	4.97	19.09	<.001	.226
Intercept	22.09	1	22.10	22.09	<.001	.156
Order at Formation	.474	1	.474	1.82	.178	.004
Order at Persuasion	.023	1	.023	.089	.766	<.001
Argument Strength	33.37	1	33.37	128.09	<.001	.219
Order at Formation * Order at Persuasion	.074	1	.074	.282	.595	.001
Order at Formation * Argument Strength	.135	1	.135	.519	.472	.001
Order at Persuasion * Argument Strength	.218	1	.218	.836	.361	.002
Order at Formation * Order at Persuasion * Argument Strength	.402	1	.402	1.54	.215	.003
Error	119.32	458	.261			
Total	176.31	466				
Corrected Total	154.12	465				

ANCOVA: (Order at formation) x 2 (Order at Persuasion) x 2 (Argument Strength) framing thought relevance index as the dependent variable

Source	Sum of Squares	df	Mean Square	*F*	*p*	Partial Eta Squared
Corrected Model	65.47	7	9.35	1.15	.331	.017
Intercept	8179.4	1	8179.4	1004.7	<.001	.686
Order at Formation	6.47	1	6.47	.795	.373	.002
Order at Persuasion	7.23	1	7.23	.888	.346	.002
Argument Strength	3.85	1	3.85	.473	.492	.001
Order at Formation * Order at Persuasion	8.92	1	8.92	1.10	.296	.002
Order at Formation * Argument Strength	.248	1	.248	.030	.861	<.001
Order at Persuasion * Argument Strength	36.36	1	36.36	4.47	.035	.010
Order at Formation * Order at Persuasion * Argument Strength	2.18	1	2.18	.268	.605	.001
Error	3736.7	459	8.14			
Total	11978	467				
Corrected Total	3802.2	466				

Study 2

ANCOVA: 2 (Order at Formation) x 2 (Order at Persuasion) framing attitude reports at Persuasion as the dependent variable

Source	Sum of Squares	df	Mean Square	*F*	*p*	Partial Eta Squared
Corrected Model	8.75	4	2.19	2.28	.062	.041
Intercept	31.58	1	31.58	32.86	<.001	.134
T1 Attitude	6.95	1	6.95	7.24	.008	.033
Order at Formation	1.16	1	1.16	1.21	.273	.006
Order at Persuasion	1.30	1	1.30	1.35	.246	.006
Order at Formation * Order at Persuasion	.361	1	.361	.376	.540	.002
Error	204.67	213	.961			
Total	4791.4	218				
Corrected Total	213.42	217				

ANCOVA: (Order at Formation) x 2 (Order at Persuasion) framing thought favorability index as the dependent variable

Source	Sum of Squares	df	Mean Square	*F*	*p*	Partial Eta Squared
Corrected Model	1.67	3	.557	2.04	.110	.028
Intercept	1.18	1	1.18	4.32	.039	.020
Order at Formation	.168	1	.168	.614	.434	.003
Order at Persuasion	.269	1	.269	.983	.323	.005
Order at Formation * Order at Persuasion	1.23	1	1.23	4.51	.035	.021
Error	57.95	212	.273			
Total	60.81	216				
Corrected Total	59.63	215				

ANCOVA: (Order at Formation) x 2 (Order at Persuasion) framing thought relevance index as the dependent variable

Source	Sum of Squares	df	Mean Square	*F*	*p*	Partial Eta Squared
Corrected Model	8.97	3	2.99	.556	.645	.008
Intercept	3057.1	1	3057.1	568.57	<.001	.727
Order at Formation	<.001	1	<.001	<.001	.998	<.001
Order at Persuasion	.294	1	.294	.055	.815	<.001
Order at Formation * Order at Persuasion	8.67	1	8.67	1.61	.205	.007
Error	1150.6	214	5.38			
Total	4214.0	218				
Corrected Total	1159.6	217				

File Drawer Study

ANCOVA: 2 (Order at formation) x 2 (Order at Persuasion) x 2 (Argument Strength) framing attitude reports at Persuasion as the dependent variable

Source	Sum of Squares	Df	Mean Square	*F*	*p*	Partial Eta Squared
Corrected Model	434.35	8	434.35	51.19	<.001	.416
Intercept	362.93	1	362.93	342.16	<.001	.373
T1 Attitude	1.36	1	1.36	1.28	.258	.002
Order at Formation	.201	1	.201	.189	.664	<.001
Order at Persuasion	1.42	1	1.42	1.34	.247	.002
Argument Strength	430.56	1	430.56	405.93	<.001	.414
Order at Formation * Order at Persuasion	.015	1	.015	.014	.906	<.001
Order at Formation * Argument Strength	.442	1	.442	.417	.519	.001
Order at Persuasion * Argument Strength	1.20	1	1.20	1.13	.289	.002
Order at Formation * Order at Persuasion * Argument Strength	.012	1	.012	.011	.915	<.001
Error	608.83	574	1.06			
Total	11000.6	583				
Corrected Total	1043.2	582				