PRESCHOOLERS RESTRICT THE SCOPE OF LABELS WITHIN THEIR OWN LINGUISTIC GROUP

by

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Abstract

An understanding of the conventional nature of language entails a recognition that word meanings are shared widely within a group, but due to the arbitrary nature, vary across different groups and are limited to those individuals who use them. Within a linguistic group, many words are shared by all speakers; however, some word meanings are shared by a subset of speakers. For example, in the U.K. trucks and elevators are referred to by different names. No work has examined whether children understand that word meanings are shared narrowly within their own linguistic group. To better understand children’s appreciation of the restricted scope of word meanings, and thus their conventional understanding of language, I examined whether children assumed that familiar and newly acquired labels would be shared by an English speaker who uses non-local conventions. Moreover, I asked whether a speaker’s accent might affect children’s judgment of one’s conventional knowledge. A native accented experimenter trained children on two novel object labels. Children were then familiarized to a video of a speaker with either a native or non-native accent who spoke English but labeled familiar objects with either conventional or novel labels. Children then participated in a disambiguation task, in which they were presented with an object, which they had a previous label for, and an unnamed object. On certain test trials, the object pair was a familiar and a novel object, and on other trials, it was the training object pairs from earlier on. I found that when the speaker previously used non-local conventions, children did not assume that the speaker would have knowledge of the conventional names of the objects during test. In contrast, when the speaker previously used local conventional labels, children assumed that the speaker would have knowledge of the familiar objects during test. These findings suggest that children may recognize that word meanings can be shared narrowly within their own linguistic group, which provides evidence that children may understand that word meanings are arbitrary agreements shared by specific group. This finding supports the possibility that children’s understanding of language is consistent with the principles of conventionality.
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Chapter 1

Introduction

Imagine travelling to the UK, confident in your ability to communicate with your fellow English speakers, you are shocked to find that some of the words you use are not readily interpreted. For example, “You call out “Nice Fanny” with the goal of complimenting someone’s fanny pack and end up getting slapped. The fact that people who speak a common language do not necessarily use the same words for objects and concepts highlights a fundamental aspect about language; the connections between words and their references are arbitrary. That is, there is nothing about a particular object that requires it to be called by a particular name. Thus, two people who putatively speak the same language might occasionally have different names for objects and concepts in the world. The goal of my thesis was to investigate children’s understanding that words for objects can be shared narrowly even when the broader formal aspects of the language are shared.

An important question concerns how, if word-objects links are indeed arbitrary, speakers of a language come to expect particular words to refer to certain objects. The answer to this question, at least in part, is the concept of “conventionality.” In contrast to naturally stipulated, or “objective” truths about the world, conventions are rules or practices that people are assumed to follow in order to coordinate fundamentally social interactions, like communicative exchange (Lewis, 1969). Words have meaning because people within a linguistic community agree on how a word is to be used. Understanding the conventional nature of word meanings entails two separate but related aspects. The first is that word meanings within a linguistic community are assumed to be shared widely by members. Within this community, specific words express certain
meanings and members are expected, and expect others to use these in communicative contexts (Clark, 1990). For example if I want something to drink out of, I would ask for a cup as that is the agreed upon conventional label. Moreover, I would do so without first checking to determine whether my partner will understand. Instead, I assume that as a fellow English speaker, they will know the conventional label.

Yet, the assumption that others will know the labels of objects is not always valid. An obvious example of this comes when addressing speakers from wholly different linguistic communities. There is no reason to think that someone who speaks, say, French will use the same word to refer to a four-legged animal that meows that an English speaker might use. As noted above, the violation of the “shared knowledge” assumption might be even more stark in the case when a speaker of a shared language uses a different word to refer to a familiar object. What these examples show is that although the principle of conventionality stipulates that language has communicative power because knowledge of word meanings is shared, it also specifies that any given word meaning has a communicative scope that is limited to those people who actually share the knowledge (Kalish & Sabbagh, 2007). Further complicating the matter is that upon learning a new word meaning, its communicative scope is not obvious. Within a language many words are shared broadly by all speakers. For example the word cat to describe a four-legged animal that meows is shared almost universally. In contrast, there is considerable cultural variation on how to refer to a woollen winter hat; it goes by tuque, toboggan, beanie or knit cap depending on the socio-cultural group you are interacting with. The determination of whether a word meaning within a language has a broad or narrow communicative scope relies on experience with using the word.
In combination, these two implications of conventionality act as guide for how word meanings should be appropriately shared and restricted. Understanding both of these aspects allows one to judge when word meanings may be extended for use with certain groups, and instances when a word will not be understood, and therefore its use should be restricted. For example, knowing that the words lorry, bobby, brolly and butty would be widely understood by speakers from the UK but hold little meaning with speakers in Canada would make you a better communicator across both groups. Considering its implications for flexible communication, it is not clear whether children understand the arbitrary aspect key to a conventional understanding of language, which would support their ability to restrict and extend labels within their own language. I will review the existing evidence of whether children understand the two aspects of conventionality and then discuss how the ability to appreciate that word meanings can be shared narrowly provides clearer evidence to children’s understanding of arbitrariness of words meanings and more generally language as a conventional system.

**Understanding the shared nature of word meaning**

Much of the evidence investigating children’s sensitivity to the conventional properties of language is based on work examining whether children understand that word meanings are shared. At first blush, we might expect that understanding that others have knowledge that has not been made manifest may seem to require relatively late-emerging social cognitive skills. However, there is now good evidence to suggest that children act in accordance with this assumption from before their first birthday. In one study, Henderson and Woodward (2012) familiarized 9-month-old infants to a speaker who either labeled an object with a novel label (e.g. “Look a fep”) or expressed a preference towards an object (e.g. “I like this one”). Afterwards, infants viewed a test event in which a second speaker either used the same label or expressed a
preference for either the same object or a different object. Infants showed evidence that they were surprised (i.e., they looked longer) when the second speaker used the same label to refer to a different object. Infants did not, however, show evidence of surprise when the second speaker simply liked a different object from the first. These findings suggest that, in line with an appreciation of conventionality, infants expected two different speakers to use labels in the same way. They did not, however expect two different individuals to have the same preferences towards objects, thereby providing some evidence that children’s sensitivity to the fact that language is shared is specific to language and not a general epistemic property.

Although suggestive of an early awareness of the shared nature of word meanings across speakers, the looking time methodology leaves open some questions as to whether this interpretation is warranted. An alternative explanation is that infants might have expected that different objects should have different names. Thus, when the second speaker used the same label to refer to a different object, this act violated an assumption about the ways in which things are labeled. Although alternative interpretations such as these are commonly at issue when interpreting a single study that uses implicit dependent measures such as violation of expectation, better evidence for an understanding that speakers share knowledge of word meanings be found in behavioral studies with older children who can make explicit judgments (e.g. pointing or vocalizations).

In one study that used more explicit behavioral measures, Graham, Stock, & Henderson (2006) introduced 19-month-old children to a novel object by using a novel label (i.e., this is a fep) or a preference (i.e., I like this one). In a subsequent test event, a second speaker who was absent during the initial labeling tested children with the same label (e.g. “point to the fep”) or a preference (e.g. “point to the one I like”). When asked to point to an object using the same label,
children selected the object that was labeled during training, but were at chance when asked to point to the object the second experimenter said she liked. These findings show that even before their second birthday, children understand that word meanings are expected to generalize across situations and speakers, though preferences are not.

These findings dovetail well with findings from other studies, generally with somewhat older children, showing that children will typically expect word meanings to be shared across situations and speakers, but that idiosyncratic information will not. For instance, children understand that information such as proper names, individual goals and desires, and personal histories will not be widely known by the individuals they interact with (Birch & Bloom, 2002; Buresh & Woodward, 2007; Diesendruck & Markson, 2001; Henderson & Graham, 2005).

Although children expect that word meanings will be shared widely by those they interact with, it is possible that they do not recognize that the reason word meanings are shared is because they reflect agreements among individuals on how to refer to objects. What children may believe is that words are shared widely because they are naturally stipulated facts about the objects they represent. In contrast to conventions, which are arbitrary agreements, a naturally stipulated fact represents an objective truth about the world that is independent of the individuals that share them. For example, knowledge such as “the sky is blue” or “animals eat food” are universally shared and invariable across individuals. One would predict that children would similarly assume that factual information is also widely known by the individuals that they interact with. Thus, important to interpreting children’s assumptions about the shared nature of word meanings concerns whether children appreciate that word meanings are not facts about objects, but arbitrary group agreements on what to call an object. This distinction may be difficult for children given that conventions, to a certain extent, represent a truth about the world that applies to large, albeit
restricted group of individuals. What is key then to answering the question of whether children understand that word meanings are arbitrary is evidence that they recognize that conventions are not universal, but restricted to specific groups. That is, whether children demonstrate an understanding that the words shared within their own linguistic group may differ from the words shared by other groups. In addition, an appreciation that one’s conventional way of referring to things will not be assumed to be known to individuals of other groups. Evidence that children appreciate that word meanings have a limited scope of who they are shared with would provide evidence to support the theory that children’s shared assumptions about word meanings are in accordance with the principles of a conventional understanding of language.

**The restricted scope of word meaning**

Evidence that children understand that word meanings reflect group agreements that are limited in scope, comes from work examining children’s judgments about word meanings across linguistic groups. There is work to suggest that infants may be sensitive early in life that languages have different ways to refer to objects. Henderson and Scott (2015) familiarized 14-month-old infants to a English and French speaker singing nursery rhymes in their respective languages. Afterwards, infants viewed a test event in which one at time, each of the speakers used a novel label to refer to the same object or used the novel label to refer to separate objects. Infants were surprised when the French and English speaker used the novel label to refer to the same object. Infants did not, however, show a similar reaction when the French and English speaker labeled separate objects with a novel label. These results suggest that shortly after their first birthday, infants may already have an expectation about how word meanings are restricted across languages. That is, infants do not expect speakers from separate linguistic groups to use the same word to refer to an object. Although these findings provide intriguing evidence of infants’
understanding about word meanings across languages, the looking time measures again, leave a
certain level of ambiguity in the interpretation of what infants are responding to. An alternative
explanation to these findings is that infants’ looking time reflected a familiarity preference for
one labeling event over another. For instance, upon having their attention drawn to an object by
the first speaker, infants demonstrated a preference for looking at the event when the object was
again labeled by the second speaker. To better understand whether children appreciate that word
meaning vary across different linguistic groups, we turn again to the behavioral evidence with
older children.

There is some evidence that by preschool, children recognize that languages have their
own unique words to refer to objects. Au and Glusman (1990) taught 3- to 6-year-olds a novel
English word for an animal (e.g. “this is a modi”) and then asked if they wanted to learn the
name for an animal in Spanish (E.g. “Theri is a Spanish word for this animal”). Research on
children’s word learning demonstrates that children operate on an assumption that objects have a
single category label and are reluctant to learn a second label for an object when they have an
existing conventional label for it (Markman, 1994). In this instance, however, if children
appreciate that other languages can have a different word with the same meaning (e.g. pero for
dog), then they might be open to learning a second label for an object. Indeed, what Au and
Glusman found was that when it was salient that the words came from different languages,
children were more likely to map the Spanish word theri onto the object that had been previously
labeled in English as modi. Moreover, the majority of children answered yes when asked by the
experimenter whether the same object could be called a modi in English and theri in Spanish. In
contrast, when the word theri was not introduced as a label from another language, children did
not map it onto the object that had previously been labeled modi. If children believed that there
was a single set of words to refer to objects, one would have expected them to not learn a second label for the object initially labeled *modi*. These findings indicate that children recognize that what objects are called can vary across linguistic groups, providing some evidence that they might appreciate that word meanings are not facts about objects but rather arbitrary connected.

One question that emerges from these findings is whether children expect individuals to have knowledge of the other ways an object is referred to across different languages. Conventional knowledge is expected to be limited to the word meanings used by a particular linguistic group. That is, a group with one set of word meanings is not expected to know the word meanings used by other groups. For example, there is little need that a French speaker should know the specific words used by a German or Spanish speaker, only that they are different from their own. To answer this question, Diesendruck (2005) examined whether children expected a person who spoke one language to have knowledge of words in another language. To this end, Diesendruck took advantage of a well known word learning phenomenon called the disambiguation effect. The disambiguation effect occurs when children are presented with two objects, one that children have a conventional name for and one that is unnamed. When provided with a novel label, children tend to select the unnamed object as the intended referent. A socio-pragmatic explanation for the disambiguation effect is based on making judgments about the intentions of a communicative partner on an assumption about their knowledge. The socio-pragmatic hypothesis states that when there is a conventional form for an object and a speaker uses a novel label, it is because the individual has an alternative referent in mind (Clark, 1990). Importantly, this pragmatic inference is based on an assumption that one’s communicative partner shares the same conventional knowledge. Based on this socio-pragmatic explanation, Diesendruck proposed that children might not show the disambiguation effect if there was
evidence that the speaker did not know the conventional label for the named object in the pair. For example, if someone spoke another language you should not assume that they would share knowledge of your object labels and thus, their novel label could refer to either the named or unnamed object. In the study, 3 and 4-year-old Hebrew-English bilingual children were taught labels in English for one of two novel objects and later tested by a puppet who was either a monolingual Hebrew speaker or, similar to the children, a Hebrew-English bilingual speaker. Diesendruck found that when tested by the monolingual puppet, children did not show the disambiguation effect. Namely, they did not assume that the Hebrew puppet would know the English label and so interpreted the novel label as referring to either of the objects. In contrast, when the puppet was bilingual and thus had knowledge of both English and Hebrew labels, children were more likely to assume a novel label referred to the object unnamed earlier by the English speaker. These results indicated that children do not expect speakers of different languages to have knowledge of the word meanings outside their language.

Taken together these three studies suggest that children appreciate both that what objects are called can vary and that knowledge of these word meanings is shared only by one’s group. These findings provide some evidence that do not children perceive word meanings as fact but possibly as arbitrary group agreements. However, one issue is that the work discussed only examines children’s understanding of how word meanings vary across linguistic groups. It is possible that children have an assumption that word meanings only vary across languages but not within. Namely, children might believe that there are multiple linguistic systems each with unique word meanings, but within a system there is a single set of words that people use. What might encourage this perception is that word meaning do tend to be constrained by linguistic groups and
the people within your immediate socio-linguistic group are likely to all use the same linguistic conventions.

However, word meaning can also be shared narrowly within a linguistic group. Diverse experiences or cultural influences can lead to the invention of new words for speakers who share a common language. For example, butty and sandwich are two ways in which groups who speak English have different words to describe meat and cheese between two slices of bread. No work to date has examined whether children appreciate that word meanings vary within their own linguistic group. This might be particularly difficult given that for the most part speakers within a language share almost entirely all of the same word meanings. If children recognize that word meanings can be shared by a subset of speakers within their linguistic group, it would provide stronger evidence that children understand that word meanings reflect arbitrary group agreements that transcend linguistic group. More generally, combined with the other literature discussed, children’s appreciation of these narrowly shared word meanings would provide evidence that children understanding of language is consistent with an assumption of conventionality.

**Current Work**

I investigated whether children would assume that labels, both familiar and newly acquired, would be shared by another English speaker who previously demonstrated a propensity to use non-local conventions. Children observed an English speaker name familiar objects using a conventional or non-conventional label. To clarify that the speaker was an English speaker from another region, the speaker introduced herself as visiting from a foreign place and prefaced each novel label by saying that it was the label used where she was from. Moreover, she used novel labels, rather than incorrect conventional labels, to describe familiar objects. For example, she used the novel word *wug* to label a bus. Previous work demonstrates that when English speakers
misuse conventional labels for objects (e.g. calling a cup a shoe), children as young as 16-months of age correct them with the conventional label (Koenig & Echols, 2003).

In addition to the foreign speaker’s use of local versus non-local conventions for an object, we also examined how speaker accent might affect judgments of the scope of word. Variation in how one pronounces words might be a cue that one’s word knowledge differs from your own. From early on in life, infants are sensitive to accents across languages and by 4-years-old there is evidence that children can detect regional accents within their language (Kinzler, Dupoux & Spelke, 2007; Nathan et al., 1998). Research has demonstrated that children prefer to learn words from those who share the same accent as them (Corriveau, Kinzler, & Harris, 2011). One hypothesis for children’s preference for native accented speakers, is that one’s accent might signify his or her membership to a particular socio-linguistic group and thus children may think that words learnt may not be shared by their own cultural group (Corriveau, Kinzler, & Harris, 2011; Kinzler, Dupoux & Spelke, 2007). However, no work to date has specifically examined children’s judgments of accented speaker’s conventional word knowledge. Thus, children may use accent as a cue on how word meanings will be shared within a language. I included accent to assess whether children would use it as a cue in their judgments about whether the foreign speaker would share familiar and newly acquired labels.

In this study, children first were trained on labels for novel objects from a native Canadian experimenter during a training phase. Afterwards, observed a foreign English speaker use either conventional object labels or novel labels to refer to familiar objects. To test whether children would restrict knowledge of the conventional object labels, I used a disambiguation task similar to one used in the study by Diesendruck (2005). Using a novel label, the foreign speaker instructed the child to point to one of two objects presented onscreen; one object that the child
had a name for and one that was unnamed. On certain trials, the unnamed/named object pair onscreen consisted of a familiar object and a novel object. On other trials, the object pair was the object pairs from the training phase earlier in the experiment. Research demonstrates that children expect both familiar and newly acquired word meanings to be shared widely among English speakers (Henderson & Graham, 2005; Disendruck & Markson, 2001). If children judge that a conventional object label may not be known than it would be expected that children would show restriction across both familiar and newly acquired labels.

During the disambiguation task, children’s pointing selection was used as the final referential decision on which object they judged a novel word referred to. I was also interested in differences in children’s decision-making process leading up to their final object selection. Research demonstrates that in cases of referential ambiguity, when it is not clear from the utterance what the referent is, processing time is greater and children’s eye movements are more likely to alternate between objects (Trueswell & Gleitman, 2004). If children are uncertain about which object the foreign speaker wants, then this may be reflected in the time it takes for them to make a decision and their pattern of eye movements. To this end, I measured the number of alternations of eye movements between the objects onscreen and the time it took from the onset of the picture arrays to when children pointed to an object.

**Hypotheses**

Based on prior work, I predicted that when the foreign speaker previously used conventional object labels, children would assume that a novel label during test referred to an unnamed object in the pair. Children’s selection of the unnamed object would provide evidence that children expected the foreign speaker to have knowledge of conventional object labels. In contrast, I predicted that when the foreign speaker previously used non-conventional object
labels, that during test children would be equally likely to point to either the named or unnamed object in response to a novel label. This would provide evidence that children did not assume the speaker shared knowledge of other conventional words, thus a novel label could refer to either object.

I predicted that accent would highlight that a speaker might have different conventional word knowledge and so when combined with direct evidence that a speaker did not have the same conventional knowledge than children would be less likely to select the unnamed object compared to when the speaker did not have an accent. Differences in performance on the disambiguation task when the speaker had an accent would indicate that children use accent as a cue when making judgments of whether a speaker would share knowledge of familiar and newly acquired labels.

When the label may be interpreted as a label for either object, I predicted that the length of trials would be longer, indicating a greater uncertainty and time spent processing. Moreover, children’s eye movements would show more alternations between the objects compared to condition in which children can assume that the speaker has the same conventional object labels as themselves.
Chapter 2

Method

Participants

Sixty-one 4-year-old children were recruited to participate in the study from a database drawn from a primarily, white, middle-class population in Eastern Ontario, Canada. Data from 13 children were excluded due to technical difficulties with the eye tracker \((n = 9)\), refusal to complete the experimental task \((n = 2)\), and experimenter error \((n = 2)\). The final sample included 48 normally developing English-speaking children (20 males) between the ages of 48 months and 59 months \((M = 53.08, SD = 3.93)\). There were no significant differences across the four experimental groups in terms of children’s age, receptive language (PPVT scores) and level of exposure to a second language (See Table 1 in results).

Design

A 2 x 2 factorial design was employed with two between-subject factors. Children were randomly assigned to one of four between-subject experimental conditions: (1) Accent – Same Label – in which the foreign speaker was accented and used conventional labels for familiar objects, (2) Accent-Novel Label - in which the foreign speaker was accented and used a novel label for familiar objects. The other two conditions, (3) No Accent – Same Label and (4) No Accent – Novel Label were identical to the other Label conditions but the foreign speaker did not have an accent. The study consisted of 3 phases: label training, speaker familiarization, and label extension. In label training, the experimenter introduced children to two novel objects pairs and taught children labels for one of the objects in each pair via ostensive naming. One object served
as the named object while the other was the unnamed object. In the speaker familiarization phase, children observed a video taped interaction between a foreign English speaker and a local English speaker playing with and labeling familiar objects. In the label extension phase, children were seated in front of an eye-tracking computer and were told that the foreign speaker needed the child’s assistance in pointing to objects she wanted to play with. Children heard the foreign speaker request an object and then a pair of objects appeared onscreen. Children’s pointing selections and eye movements were recorded in response to 12 test trials.

Materials

Stimuli. In the label training phase (see Figure 1), two sets of four novel objects were used as training objects. In the speaker familiarization phase, 4 familiar objects were used (bus, cup, book, doll). The objects were paired and one object was randomly assigned to be the named object that children were taught a label for and the other was the unnamed object. In the label extension phase, children were presented with pairs of objects individually on a computer screen, which was accompanied by a verbal request from the foreign speaker. There were three types of test trials that children viewed - the training object trial type depicted pictures of the object pairs used in training. The familiar object trial type depicted two objects, one familiar (e.g. shovel) and one novel. The novel object trial type was included as a baseline for children’s chance performance and depicted the novel object set that was not used in the training phase.

Novel words. During the label training phase, the experimenter used two novel words to label the novel objects: bexo and plinker. In the speaker familiarization phase of the Novel Label conditions, the accented speaker used four novel labels for the familiar objects: fep, modi, bosa, and dax. In the label extension phase, the accented speaker used six novel words to request for the
objects she wanted (e.g. lart, danu, dozkot, fleep, kip, toma). These words were unfamiliar and followed English phonotactic constraints.

**Videos.** For the speaker familiarization phase, I created four videos that depicted two speakers, one who was from Kingston and the second, who was from a foreign place called Mendora. In the Accent conditions, the faraway speaker had a British-type accent and in the No Accent conditions, the faraway speaker had a native Canadian accent. After each speaker introduced themselves and where they were from, they labeled four familiar objects together. In Same Label conditions, the foreign speaker used conventional labels to describe the familiar objects and in the Novel Label conditions, the foreign speaker used novel labels to describe the familiar objects.

**Vocabulary measures.** The Peabody Preschool Vocabulary Test was used to assess whether receptive vocabulary was equal across experimental groups. In addition, the tasks in the study required children to follow instructions, answer questions and point to objects in response to a speaker’s request. Receptive vocabulary scores as compared to their age equivalent peers ensured that each participant was able to understand the tasks.

**Language Background measures.** Some research indicates that children who are exposed to a second language may be more aware of the conventional nature of words (Akhtar et al., 2012; Genesee, Boivin, & Nicoladis, 1996). To ensure that groups did not differ in number of children who were monolingual and exposed to second language, parents completed a language proficiency questionnaire developed by the Language Development Lab at University of Austin, Texas. It measured the number of hours per day/week the child was exposed to each language, who they learned from and how proficient the parents judged the child to be.
**Procedure**

**Arrival.** Upon arrival to the lab, children had a short warm up period where they were familiarized to the testing space and the experimenter. Another experimenter played with the child while I went through the study and consent process with the parent. Once the parent completed the consent forms and the child provided verbal assent then the testing began.

**Testing Session**

**Label Training.** Children were seated at a small table in an experimental room. The experimenter told the child that she had some toys to show them and the objects were hidden from view beside the experimenter. One object at a time, the experimenter introduced 4 novel objects and provided a novel label for two of the objects (E.g. “Look this is a *plinker*”). For each named object the experimenter labeled the object five times. For the objects that were unnamed, the experimenter drew the child’s attention to the object in a similar manner without using a label (E.g. “Look at this!”). The child was given 20 seconds to play with each object. The named and unnamed designation and presentation of the novel objects were counterbalanced across objects and participants.

![Figure 1. Pictures of novel toys used in the study.](image)
**Speaker Familiarization.** The experimenter told the child that they were going to meet two of the experimenter’s friends and later on play a game with one of them. Children were seated in a high chair in front of eye tracking computer screen. In the video the two speakers introduce themselves and say where they were from. The speakers see some toys and decide to look at them together. In the Same Label conditions, the Canadian and foreign speaker (i.e. from Medora) both used conventional labels for the familiar objects (E.g. Canadian: “Look it’s a cup”, Foreigner: “In Mendora, where I am from, we call it a cup, you call it a cup and we call it a cup!”). In the Novel Label condition, the foreign speaker used a novel label for the familiar objects (E.g. Canadian: “Look it’s a cup”, Foreign Speaker: “In Mendora, we call it a dax, you call it a cup and we call it a dax!”). For two of the familiar objects, the Canadian speaker introduced and labeled the object first (as shown by examples above) and for the other two objects the foreign speaker introduced and labeled the object first (E.g. Foreigner: “Look it’s a dax/bus”, Canadian: “Oh, here in Kingston, we call it a bus, you call it a dax/fep, and we call it a bus”). After the video, the experimenter told the child that her friend from faraway wanted to play with some toys but that the experimenter didn’t know which ones, so the friend from far away was going to tell them which ones she wanted to play with.

**Label Extension.** Children’s attention during the label extension phase was measured using a 1700 tobii eye-tracker. The eye tracker was positioned approximately 18 inches from the child and filmed their head and eyes. Eye gaze data was collected at a frame rate of 50hz. First, children’s eye gaze was calibrated using E-prime Extension for Tobii Software. The calibration required the child to follow a red dot that moved to nine different points on the screen. Calibration was deemed acceptable if seven out of nine points on the screen were calibrated. Once calibrated, the experimenter initiated the E-prime visual stimuli presentation. A picture of
the foreign speaker came on the screen and she said, “Hi, its me again Sara, I want to play with some of the toys, can you point to ones I ask for?” To ensure comprehension, the experimenter reiterated the goal of the game and said, “She is going to tell you which toys she wants to play with, and your job is to point to one she asks for”. Once the child understood and demonstrated how to point to the screen, the disambiguation test began. On each trial, the face of the foreign speaker would appear on the screen and she requested an object using a novel label not yet heard by children (E.g. “Look a fleep, I want to play with the fleep”) (see Figure 2). A fixation cross flashed on the screen for 500ms and then two objects appeared on the screen. Once the child pointed to an object the next trial began. Each participant viewed two object arrays for each of the three types of test trials in a counterbalanced order. After the child saw each of the trial types once (total of six object pairs), the experimenter claimed she forgot to write down the toys her friend wanted and that the friend was going to tell the child again which toys she wanted to play with. The six object pairs were shown again with the object position switched so that objects on the left were then situated on the right of the object array. For each of the trial types, children had a total of 4 trials.

![Image](image_url)

*Figure 2. Example of familiar object test trial during Label Extension phase.*

After children completed the label extension phase, they were asked a set comprehension questions to determine whether they were sensitive to the experimental manipulations and whether they learned the novel labels during the training phase. Children were asked which
speaker was from a foreign place (“Which one of my friends is from faraway?”), whether or not she used the same labels as the Canadian speaker (She [Canadian speaker] called this a bus, did she [foreign speaker] call it a bus?”), and if children were in the Accent conditions, which speaker used an accent when she spoke (“Which one of my friends sounds like you and me when they talk?”). Then the child was presented with the training object pairs and asked if they remember which objects matched with the novel labels they were taught (“Which one is the bexo/plinker”).

Data Analysis

Trial Length - Video coding. To code for individual trial length, a trial began when the test objects appeared onscreen and ended when the child started to point (e.g. first movement of the shoulder). In some cases, the child asked the experimenter for assistance (e.g. “which one is the fleep?”). On these, the trial ended when children started to speak as I judged their question as an indication of a decision on what the label referred to. These individual trial lengths were used to examine the eye gaze data for each participant.

Trial Length - Data Cleaning. The average length of trial was calculated across all participants within a group and individual trial lengths were compared to this average to identify any trials that were outliers due to children’s lack of attention to the test trial. On the majority of trials, children took anywhere between 500ms and 8000s ms to respond. Trials that were distinctly longer or shorter than this were examined to determine whether the child was indeed taking longer to make a decision or possibly not paying attention to the task. The instances in which children were not paying attention on a trial were not included in the final analysis.
**Gaze Data Analysis Preparation.** For each participant the eye tracking software produced an output file that summarized children’s eye movement patterns on each of the 12 trials. Using Matlab software, the length of the individual test trials was used to identify frame by frame where children looked over the course of each test trial. Alternations were coded when a participant changed their eye gaze from one object to another. Trials in which eye gaze was not recorded due to children’s movement or technical issues with the eye tracker were not included in the final analysis.
Chapter 3

Results

Comprehension Questions

There were no differences across groups on percentage of correct answers on any of the questions so I collapsed across conditions. On the foreign speaker comprehension question, 90% of the time, children correctly identified which speaker was from far away. Eighty seven percent of the time children correctly identified when the speaker used the same or different as the other speaker in the video. Children correctly identified the accented speaker 60% of the time. With the exception of speaker accent, these results indicate that children were sensitive to the experimental manipulations. Eighty four percent of the time children correctly remembered the labels for the objects introduced during the Label Training phase, which indicates that the null finding during test for the objects taught during training was not due to children simply forgetting the word-object links.
Table 1. Children’s age, PPVT scores, and number of children exposed to a second language for each of the conditions.

### Pointing Selections

To examine whether children’s object selection on the familiar and training trials differed based on speaker accent and conventional knowledge, I conducted two bootstrapped 2 (Accent) X 2 (Label) factorial ANOVAs. Data were bootstrapped 2000 times for each experimental condition using SPSS bootstrap selection, and means and bias-corrected confidence intervals of the distribution of these means for each group were calculated. The dependent variable of this analysis was children’s average selection of the unnamed object in the object pair.

**Children’s pointing selections on familiar object trials.** There was no significant interaction between whether speaker had an accent and the conventional label use on children’s pointing selections, $F (1,44) = 1.19, p = .281, \eta^2 = .03$. There was a significant main effect of label type, $F (1,44) = 3.62, p = .037, \eta^2 = .10$, such that children in the Novel Label condition ($M = .61, SD = 0.35$) were significantly less likely to select the unnamed target in response to hearing a novel label than children in the Same Label ($M = .81, SD = 0.27$). To determine whether children were choosing the unnamed object significantly greater than chance, I conducted two 1 sample t-
tests for the Same and Novel Label groups. Chance performance was selecting the unnamed object 50% of the time. The selection of the unnamed object for the Novel Label group was not significantly different from chance, $t(23) = 1.58, p = .126$, which demonstrates that children were equally likely to select either the named or unnamed object during test. The Same Label group significantly differed from chance performance $t(23) = 5.57, p < .05$. Children were significantly more likely to select the unnamed object in response to a novel label. This indicates that when a foreign speaker previously used non conventional labels children did not assume that familiar and novel labels would be shared by foreign speaker and so interpreted a novel label as referring to either the named or unnamed object. In contrast, when the foreign speaker previously used conventional object labels, children assumed that she would share knowledge for familiar and novel labels and so interpreted the novel label as referring to the object that children did not yet know the name for. There was no main effect of accent on children’s object selections, $F(1,44) = .09, p = .761$. $\eta^2 = .002$ which indicates that speaker accent did not affect children’s judgments about what the novel label referred to.

**Children’s pointing selections on training object trials.** For training trials, there were no significant interaction or main effects, $F$s(1.44) $< 1.38, p > .247$, $\eta^2 < .03$. Children’s object selection was equivalent across the four conditions. To assess whether children in the training trials were selecting the unnamed object in response to a novel label, I conducted a one sample t-test to compare the grand mean to the expected score if children were at chance at selecting either object. Children were not significantly above chance during on the training trials, $t(47) = 1.20, p = .237$, demonstrating that they were equally as likely to select either the named or unnamed object in response to a novel label. This indicates that children judged that a novel label referred
to either the named or unnamed object regardless of whether she previously demonstrated knowledge of conventional labels or spoke with an accent.

**Trial Length**

To examine whether children’s trial length on the familiar and training trials differed based on speaker accent and conventional label use, I conducted two 2 (Accent) X 2 (Label) factorial ANOVAs. The dependent variable of this analysis was children’s average trial length. There were no significant interaction or main effects for the Familiar object trials $F_{(2,94)} < .956, ps < .333, \eta^2 < .02$ or for the Training object trials, $F_{(1,44)} < .703, ps > .406, \eta^2 < .02$. To determine whether there was a difference of trial length across the type of test trials, I conducted a Repeated Measures ANOVA to compare the length of trial for familiar, novel, and training object trial types. There was no significant difference on length of trial across the trial types $F_{(2,94)} = .712, p = .493$, which indicates that there was no difference on trials in which children truly had no clear referent for a novel label (Novel test trials) and when there was potentially a clear referent for the novel label (Familiar trials – No Accent – Same Label group). This indicates that the time to make a decision about what a label referred to was not significantly affected by whether the speaker had an accent or previously demonstrated non-conventional naming of familiar objects. That is, even on trials when it was not clear which object the novel referred to, children were no slower in making a decision than when there was a clear referent.

**Eye gaze Data**

Due to technical issues with the eye tracking technology, quality eye gaze data could not be collected for the full sample. The final sample for the eye gaze results (N=39) was smaller
than the behavioral sample (N=48) and the groups were unequal. In light of this, the results from the eye gaze analysis were interpreted cautiously.

**Alternations of eye gaze across the test objects.** To examine whether children’s trial length on the familiar and training trials differed based on speaker accent and conventional label use, I conducted two 2 (Accent) X 2 (Label) factorial ANOVAs. The dependent variable of this analysis was the mean number of alternations between the object. There was no significant interaction or main effects for the Familiar trials $F_{s}(1,35) < .085$, $p > .313$, $\eta^2 < .03$ or on the Training trials, $F_{s}(1,35) < .162$, $p > .168$, $\eta^2 < .04$. The average number of times children altered their gaze was 1.3 times per trial ($SD = 0.57$), indicating that children attended to both objects before making a selection. There was no difference in the proportion of looking time toward the unnamed object across the 4 conditions $F_{s}(1,35) < .90$, $p > .350$. On average, children looked at the unnamed object for 60% of the trial.
Chapter 4

Discussion

The purpose of my study was to investigate whether children assumed that familiar and newly acquired labels would be shared by an English speaker who demonstrated a propensity to use non-local conventions. To this end, I used a disambiguation task to assess how children interpreted the referent of a novel label in the presence of an object they already had a name for (e.g. either familiar object or the named object during training) and an object they did not have a name for (e.g. novel object). I was interested in whether children would assume the English speaker would know the label of the named objects and thus assume that the novel label referred to the unnamed object.

Children’s Performance on the Familiar Test Trials

The current findings indicate that children may appreciate that word meanings can be shared narrowly within their linguistic group. I found that when a speaker used non-local conventions, children selected either the familiar or the unnamed object in response to a novel label. Their selection of either object indicates that children did not assume that the speaker shared the conventional label for the familiar object in the pair. These findings dovetail nicely with the work by Diesendruck (2005) showing that children will not assume that their own word meanings will be known by an individual who does not share any of the same conventions. In contrast, when the speaker previously used conventional labels, children systematically selected the unnamed object in response to a novel label, suggesting that they assumed that she had knowledge of the familiar object in the pair. Overall, what this shows is that even when an
individual shares the majority of the same words as the child, children can recognize that there may be instances in which English speakers will not share the same word meanings as themselves.

These results provide evidence against the possibility that children believe that within a linguistic group there is a single set of word meanings that is known by all speakers. That is, that word meanings only vary across linguistic groups. If children thought that within a language objects could have only one name, then one would have expected that children to assume the English speaker to have knowledge of the object labels. Children’s performance indicated that when an English speaker had non-local conventions for objects, they did not assume she would know the names of familiar objects. Thus, this current work builds on previous work to demonstrate that children understand that word meanings are limited in scope but that this is not determined exclusively by your linguistic group but perhaps by other factors such as your cultural group.

The current work also helps to elucidate whether children’s understanding of language is consistent with an assumption of conventionality; that word meanings are shared widely within a group, but due to the arbitrary nature, vary across different groups, both linguistic and cultural and are limited to those individuals who use them. The current work supports the possibility that by the age of 4 children might appreciate the arbitrary nature of language, which is necessary to an understanding of conventionality. Evidence that children recognize that there are a variety of ways to refer to objects both within and across linguistic groups indicates that children do not believe that words are invariable facts about the object that they refer to. Rather the current finding, in combination with the work by Diesendruck (2005) and Au and Glusman (1990), suggests that children recognize that a word used by a particular group reflects arbitrary
agreements by the members on how to call an object. An important future direction is to extend this paradigm to examine whether children younger than 4-years-old appreciate that word meanings can be shared narrowly within their linguistic group. The work by Diesendruck indicates that 3-year-olds appreciate that an object can have a different label across languages. However, an understanding that word meanings can differ within a linguistic group may be a later development. Some support for this hypothesis comes from research indicating that 3-year-olds struggle to understand that there can be more than one English label to refer to an object. For example, 3-year-olds did not believe that a rabbit could also be called a bunny (Doherty & Perner, 1998). What may limit younger children’s ability to appreciate the scope of word meanings within a language, are changes in children’s theory of mind abilities (ToM) that occur from 3- to 4-years-old. ToM is an understanding that behavior is partly motivated by internal mental states such as beliefs and desires (Wellman, 1990). At 4-years-old children acquire an understanding of false belief; an appreciation that individuals’ representation of the world may differ from their own and others (Wellman, Cross, & Watson, 2001). This appreciation may be critical for understanding that someone might have different object labels than yourself (Perner, Stummer, Sprung, & Doherty, 2002). Examining the appreciation of scope restriction in 3-year-olds and younger is an important next step in mapping out the developmental trajectory of children’s conventional understanding of language.

What these results demonstrate is that when children observe that the English speaker does not share the same object labels, it appears that they suspend their judgment that the speaker will have knowledge of any other conventional object labels. One interesting question that emerges from this finding is how children come to understand that it is not an all-or-nothing judgment, but that some word meanings can be restricted while others are shared. For example,
although a speaker from the UK may have unique object labels, they will also share many of the same object labels as a speaker from Canada. The goal of the current work was to explore whether evidence that a speaker did not use conventional object labels would impact children’s assumptions of speaker knowledge of other object labels. Building on these current results, an important question for future research is how children’s judgments about the scope of word meanings would be impacted by both positive and negative evidence that object labels are shared by a foreign English speaker. Children may be more inclined to assume that word meanings will be known by that speaker. For instance, if the speaker only has one word that differs than children may assume that she will most likely have knowledge of other conventional object labels.

An alternative explanation of the current results is that children interpreted the foreign speaker’s use of novel labels as being incorrect and thus, judged that she would be unknowledgeable about other conventional labels. Support for this interpretation comes from work by Diesendruck, Carmel and Markson (2011) that found that 3- and 4 year-old children did not show the disambiguation effect when tested by a speaker who was previously inaccurate (e.g. labeling a shoe a cup). That is, children did not assume that an inaccurate speaker would know familiar object labels. Moreover, a study by Brosseau-Liard and Birch (2010) found that 5-year-olds predicted that a speaker who labeled objects inaccurately would not know other conventional words in the future. If children perceived that the foreign speaker was simply an unknowledgeable English speaker then it would indicate that children might not appreciate that word meanings are arbitrary agreements that vary within a linguistic group. Rather it would suggest that children perceive that within a language there is a single set of word meanings to be known by speakers.
In the current work there are a number of reasons to believe that children did not interpret the speaker as being inaccurate but rather a knowledgeable English speaker. First, the foreign English speaker used correct sentence structure and grammar to refer to the objects. There is research to demonstrate that across the 4th year, children appreciate that a person’s appropriate use of syntax is a cue to whether someone is knowledgeable about word meanings within a language (Sobel & Macris, 2013).

Second, in contrast to the studies with inaccurate speakers, children are given indications to why a speaker is using non-conventional object labels. Research indicates that when children are provided with additional information for why a speaker is inaccurate, they revise their judgments of inaccuracy and treat that person as a knowledgeable informant. For example, in a study by Jaswal (2004) a speaker used the label “dog” to refer to hybrid animal that looked more similar to a cat. When the speaker clarified that the unconventional object label was intentional and provided a reason, children were more accepting of the label than if they were given the unconventional label without any explanation. Similarly, when a speaker’s inaccuracy is explained by their false belief or lack of access to relevant information, children then treat those individuals as knowledgeable during other tasks (Nurmsoo & Robinson, 2009a; Nurmsoo & Robinson, 2009b). Thus, without any explanation children may tend to believe that a speaker is inaccurate, but when they are given additional information about speaker intent or circumstances, children will treat those individuals as knowledgeable.

In the current study, additional information about the speaker’s use of non-conventional labels was provided in two ways. First, children were told that the speaker was from a faraway place and research demonstrates that children make a distinction between places nearby and faraway (Sabbagh, Henderson, & Woodward, 2015). Moreover, research on conventional game
play indicates that children may perceive that conventional knowledge may differ for places faraway. For example, one study demonstrated that when a puppet claimed to be from faraway, children did not assume that he would share the same knowledge of game rules as themselves (Schmidt, Rakoczy, & Tomasello, 2012) In the current study, the children’s responses to the comprehension questions indicated that they remembered which one of the speakers was visiting from faraway, suggesting that they may have used where the speaker was from as an explanation for her use of non-conventional labels.

The second piece of information that children were provided with was the phrasing in which the speaker introduced the non-conventional labels. After hearing how the native Canadian speaker labeled an object, the foreign speaker highlighted that the labels she used were specific to where she was from (e.g. “We call it a dax”). Research examining parent-child conversations demonstrates that parents tend to introduce conventional object labels using generic phrasing - e.g. this is a rattle (Callanan, Siegel, & Luce, 2007), and many word learning paradigms introduce labels for novel objects in the same way (e.g. Baldwin, 1991; Woodward & Hoyne, 1999; Woodward, Markman, & Fitzsimmons, 1994). There is evidence to indicate that children are sensitive to deviations from this conventional phrasing and use this additional linguistic information to help them decide whether a word will be conventional. For example when a speaker is uncertain (e.g. “I’m not sure if this is a rattle?”), children judge that a word introduced in such a way, may not be shared by other speakers (Sabbagh & Baldwin, 2001; Koenig & Harris, 2005). In the context of the current work, the foreign speaker’s deviation from generic phrasing (e.g. “We call this a dax”) may highlight that the speaker recognizes that she is using a label that differs from the conventional label known by the Canadian speaker. In contrast, inaccurate speakers introduce the non-conventional labels using generic phrasing, indicating that they are
introducing it as a conventional label. However, the speaker does not provide any additional linguistic information to why it is not the correct conventional label, possibly leading children to believe that the person is unknowledgeable about conventional labels. Overall, the manipulations made in the current study provide some evidence against the possibility that children’s performance on the disambiguation task was due to a perception that the foreign speaker was inaccurate and therefore unknowledgeable about conventional labels.

Unfortunately, the current data are not able to fully explain children’s performance on the disambiguation task. More research is needed in order to fully answer the question of whether children interpreted the foreign speaker’s use of non-conventional labels as being incorrect or as shared conventions specific to her cultural group. To address this question, research should examine whether children expect that the novel labels used by the foreign speaker to be shared by another member of that specific group. Evidence that children expect that non-local conventions will be shared among members of a specific group would provide further evidence to support the interpretation that children’s can appreciate that word meanings reflect agreements among groups and therefore can differ within a language.

**Children’s Performance on the Training Test Trials**

Interestingly, children did not show the same pattern of responding when the test stimuli were the objects introduced in training. Results demonstrated that even in conditions in which children were expected to show the disambiguation effect, when the speaker from faraway was unaccented and demonstrated knowledge of conventional labels, children were unsystematic in which object they selected in response to a novel label. This result is inconsistent with research demonstrating that when a speaker is judged to have conventional word knowledge, 3- and 4-year olds show the disambiguation effect for newly acquired labels (Diesendruck, 2005; Diesendruck
& Markson, 2001). It was not an issue of children being unable to recall the labels taught during label training as 84% of children correct identified the labels taught during training after the testing phase completed. Moreover, evidence for the disambiguation effect on familiar object trials indicates that children assumed that the foreign speaker shared the same conventional knowledge within his or her linguistic group. One important difference between the tasks in the current study and the previous work with trained novel objects, is that in previous work, each object pair was trained and tested individually. Thus children only had to remember and reason about a single set of objects at time. In the current study, two sets of object pairs were trained and then after a delay, tested in combination with two other types of test trials. It is possible that being tested on two objects pairs instead of individually in the context of the familiar and training test trials was too cognitively demanding for 4-year-olds in this task. A simplified testing paradigm such as the one used by Diesendruck and colleagues (2005; 2001) may elicit the expected performance for newly acquired labels.

**Speaker Accent**

The effect of speaker accent on children’s judgments is unclear given the findings of the current study. In contrast to my prediction, I did not find any evidence that accent affected children’s responses on the disambiguation task. What is not fully clear in the current results is whether children perceived the speaker’s accent. Children’s response to the accent probe (e.g. “which girl sounds like you and me when they talk?”) suggested that they were not sensitive to the speaker’s accent. However, it may be that the probe itself may not have been sensitive enough to elicit children’s perception of the speaker’s accent. I piloted numerous variations of the question and the final iteration was deemed to be the most sensitive. For example, “Who sounds funny when they talk?” and “Who sounds different when they talk?”. It is possible that children
interpreted the question in ways unrelated to their perception of speaker accent. For example, children may have attended to other qualities of the individual’s speech (e.g. prosody) or in general whom they thought were most similar to themselves. To elucidate these current results, future research should identify better ways to explicitly ask children about accent or use an independent task that identifies children’s sensitivity to regional accents.

**Children’s Eye Gaze Data**

Finally it is regrettable that technical issues with the eye tracker did not allow for us to fully explore children’s decision-making process through their eye movement patterns. The results from the usable eye gaze data were ambiguous. The eye-tracking paradigm in the current work made it difficult to dissociate between children’s eye movements related to the initial processing of the object pair and the eye movements related to the processing of the novel word. To distinguish between these effects, I would use a paradigm in which the object pair is presented first, allowing for initial processing, followed by the speaker’s request using a novel label. Analysis would begin at the onset of the novel word allowing us to isolate eye movements related to children’s processing of the novel word. This paradigm would be a more sensitive measure of children’s decision-making process when the individual testing them does not share the same conventional knowledge as themselves.
Conclusion

In summary, I have provided evidence showing that when an English speaker uses non-local conventions for objects, children do not assume that familiar object labels will be known by the English speaker. These findings support the idea that children appreciate that word meaning can be shared narrowly by groups within a language. Future research can provide further evidence to what extent children’s understanding of language may be guided by the principles of conventionality.
References


