Proper Names in Early Word Learning: Rethinking a Theoretical Account of Lexical Development

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Abstract: There is evidence that children learn both proper names and count nouns from the outset of lexical development. Furthermore, children’s first proper names are typically words for people, whereas their first count nouns are commonly terms for other objects, including artifacts. I argue that these facts represent a challenge for two well-known theoretical accounts of object word learning. I defend an alternative account, which credits young children with conceptual resources to acquire words for both individual objects and object categories, and conceptual biases to construe some objects (notably people) as individuals in their own right and most other objects as instances of their category.

Proper names are among the first words to appear in children’s vocabularies (e.g. Dromi, 1987; Fenson, Dale, Reznick, Bates, Thal and Pethick, 1994; Macnamara, 1982; Nelson, 1973; Tardif, Fletcher, Liang, Zhang, Kaciroti and Marchman, 2008). This fact may seem unsurprising in light of the apparent simplicity of the act of acquiring one of these expressions. Here is one account of such an act: A mother wants to teach her infant son a proper name for a family friend, who arrives one day for a visit. While the child watches and listens, the mother points to the visitor and exclaims, ‘Mary!’ As a result, the child infers that the word applies to the visiting woman and establishes a mapping between the label, ‘Mary’, and the person construed as an individual. In this way, he learns a new proper name. My aim in this paper is not to question the truth of the proposal that children easily acquire proper names for people from the outset of lexical development. My goal instead is twofold. First, I argue that infants’ early acquisition of proper names for people represents a significant challenge for two well-known theoretical accounts of object word learning. Second, I defend an alternative account of the acquisition of object words—one that provides a straightforward explanation for the facts about the initial learning of proper names.

In what follows, I begin by outlining the serious challenge children face in accomplishing the fundamental task of learning how words from different lexical classes—including proper names—are expressed in their native language. I then describe certain facts about children’s early learning of proper names. After noting these particulars, I discuss two influential theoretical accounts of the learning of object words, describing how specific versions of each one explain children’s
mastery of proper names. Both accounts, I argue, have difficulty in handling the actual details of the initial acquisition of these words. Finally, I discuss an alternative theoretical account of object word learning, and I describe how one particular version of it explains children’s early knowledge of proper names. I argue that this account is superior to the others in that it easily handles the basic facts about the acquisition of these terms, and I discuss some implications of this account for our understanding of the nature of lexical development.

1. The Puzzle of Word Learning

Human languages are built out of a handful of lexical classes, including proper names (e.g. ‘Mary’) and count nouns (e.g. ‘person’). When referring to an object (e.g. a woman), a speaker may use a word from either of these categories (e.g. ‘That is Mary!’ or ‘That is a person!’). There is, however, a fundamental semantic difference between the two usages. A count noun serves to pick out an object as an instance of a category (e.g. as a person), interchangeable with any other instance, whereas a proper name functions to pick out the object as an individual in its own right (e.g. as Mary), distinct from all other instances of the category.

A basic puzzle in the study of language development is to discover how infants identify words from different classes in their mother tongue (Pinker, 1996). For example, when infants hear a new label (e.g. ‘DAX’) for an object, how do they determine whether the word is a proper name or a count noun? Adults may be able to decide by noticing the linguistic context in which the label appears, because they have already learned how their language marks words from the two classes. For instance, if English speakers hear, ‘That is DAX!’ for a woman, they may interpret the label as a proper name, like ‘Mary’; but if they hear, ‘That is a DAX!’ for the same woman, they should treat it as a count noun, like ‘person’. Infants cannot, however, use such linguistic knowledge to guide their interpretation of object words at the outset of lexical development, because this is precisely what they need to acquire. Without some non-linguistic way to identify which object labels are proper names and which ones are count nouns, infants face a significant hurdle in learning how these word classes behave in their language. How do they solve this problem?

2. Some Features of Early Proper Name Learning

Before addressing the question of how children learn proper names in their native language, I describe some facts about the age at which they begin this acquisition and about the referents of their earliest expressions from this class. Any successful theoretical account of object word learning should, I argue, be able to explain these details. In this discussion, I make two general points. First, children appear to learn
both proper names and count nouns from the outset of lexical development, and they acquire knowledge of how these two classes are expressed in their language at an early age. Second, there is a striking difference between the referents of children’s earliest proper names and the referents of their initial count nouns: The first proper names are typically words for people, but the first count nouns are generally used to pick out a broad range of other objects, including body parts, animals, and especially artifacts.

2.1 The Time Course of Proper Name Learning

Children’s earliest vocabularies seem to contain proper names, and these expressions appear to co-exist in the lexicon with count nouns from the start of word learning. One source of evidence for this claim is a paper by Fenson et al. (1994). This article presents an analysis of parental report data gathered during the development of the English version of the MacArthur Communicative Development Inventory (MCDI), which contains a widely used vocabulary checklist. The authors found that parents reported proper names among the first words that infants understood and produced. For example, parents noted that ‘Mommy’ and ‘Daddy’ were understood by at least 85% of infants at eight months of age (the earliest age for which data were available) and that these terms were produced by at least 50% of infants at 12 months. Fenson et al. also found that parents reported a number of count nouns in infants’ earliest receptive and productive vocabularies. For instance, parents reported that words like ‘bottle’, ‘ball’, and ‘book’ were understood by 50% or more of infants at eight to ten months of age and that these labels were produced by 50% or more of infants at 14 to 16 months of age. These parental reports appear to have cross-linguistic generality. For instance, Tardif et al. (2008) recently found not only that American parents reported both proper names (e.g. ‘Mommy’ and ‘Daddy’) and count nouns (e.g. ‘ball’ and ‘bottle’) in the vocabularies of babies who produced between one and 10 words on the English version of the MCDI, but also that Chinese parents did so on recently developed Mandarin and Cantonese versions. In each language group, infants ranged in age from eight to 16 months, with an average age of 11 or 12 months.

The preceding parental checklist data are, however, difficult to interpret. Expressions like ‘Mommy’ and ‘Daddy’ are ambiguous. They function not only as proper names but also as count nouns (i.e. kinship terms) in the adult language, and mature speakers use them both as labels for individual objects (e.g. ‘Mommy is tall’) and as expressions that extend across object category members (e.g. ‘Your mommy is taller than mine’). The MCDI conflates the two interpretations. The words ‘mommy’ and ‘daddy’ (and ‘grandma’, grandpa’, ‘aunt’, and ‘uncle’) appear in a section of the inventory called ‘People’. The terms on the English inventory are not capitalized, in the manner of English count nouns, but there are no instructions for parents to distinguish between the individual and the object category interpretations of these words.
Other parental report data provide better evidence that words like ‘Mommy’ and ‘Daddy’ function as terms for individual objects in children’s earliest vocabularies, unlike count nouns, which are extendible across object category members. In her seminal study of early language development, Nelson (1973) noted that parents reported both proper names (such as ‘Mommy’ and ‘Daddy’) and count nouns (such as ‘bottle’ and ‘ball’) in the 10-word productive vocabularies of their English-learning children, and these infants had a mean age of 15 months at the time. In addition, Nelson asked parents to provide information about their children’s use of their words. These supplementary data about use indicate that the children’s earliest vocabularies contained both words for specific individual objects (specific names: ‘used to refer to one example of a category’) and words that generalized across instances of an object category (general names: ‘used to refer to all members of a category’). Nelson wrote, ‘The first 10 words ... are composed of a large number (24%) of specific names [and] somewhat more (41%) of general names’. Nelson also noted that ‘Mommy’ and ‘Daddy’ were the predominant specific nominals in children’s earliest vocabularies. Furthermore, Macnamara (1982) reported that his son, Kieran, produced both proper names (including ‘Mammy’, ‘Daddy’, and ‘Freddie’, for the family dog) and count nouns from early in lexical development, beginning around 14 to 15 months. Macnamara noted, ‘... it was uncanny how accurately he used proper names for particular individuals’, but he also observed, ‘At no time did he show any hesitation about applying a common noun to new objects’.

Not all parental report data support the claim that infants initially have an appropriate understanding of proper names and count nouns. There are data indicating that some children do not generalize all their early-learned count nouns across instances of an object category (e.g. Dromi, 1987; Nelson, 1973). Such conservative behavior does not, however, necessarily indicate that these children would not extend the words to any other object category members. Potentially more problematic are data suggesting that infants overextend early-learned proper names like ‘Mommy’ and ‘Daddy’ from the originally named parent to other category members (e.g. to other women or men). There are reports of such over-extensions in the literature (e.g. Macnamara, 1982; Nelson, 1973), although their occurrence seems to be rare. Some of these over-extensions may reflect the fact that children occasionally learn these words as count nouns (kinship terms) rather than as proper names. For example, Nelson reported that (only) one child in her sample of 18 children over-extended ‘Mom’, but that this overextension was restricted to the child’s two older sisters, suggesting a possible kinship interpretation of the word. Other over-extensions appear to arise in situations where there is a high degree of perceptual similarity between the named person and the target of the overextension, suggesting that they are cases of mistaken identity. For instance, Macnamara noted that his son’s only mistakes in applying proper names ‘were mistakes of identity owing to similarity of appearance’.

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Even when they contain details about use, parental reports of children’s early vocabularies are limited in value because they provide indirect evidence that may reflect memory biases or errors. More compelling evidence of infants’ early and roughly simultaneous knowledge of proper names and count nouns comes from a striking pair of experimental demonstrations. Tincoff and Jusczyk (1999) reported proper name comprehension (specifically, understanding of the words ‘Mommy’ and ‘Daddy’) at the age of six months. In the first of two experiments, they showed infants side-by-side videos of their parents, while an audio recording played the words ‘Mommy’ and ‘Daddy’. Infants looked significantly more at the video of the named parent. In a second experiment, infants of the same age did not adjust their looking patterns in response to ‘Mommy’ and ‘Daddy’ when the videos showed an unfamiliar man and woman, providing evidence that infants do not associate these words with men and women in general. In a subsequent study, Tincoff and Jusczyk (2000) found evidence that 6-month-olds’ lexical comprehension is not restricted to proper names. Using a method similar to that of the previous study, these authors reported count noun comprehension (specifically, knowledge that the words ‘feet’ and ‘hands’ apply to unfamiliar exemplars of hands and feet) in children of this young age. These results offer evidence that 6-month-old infants understand proper names like ‘Mommy’ and ‘Daddy’ as expressions for individual objects, whereas they understand certain count nouns like ‘hands’ and ‘feet’ as generalizing to novel instances of the object category.

The preceding parental report and experimental data do not indicate that 6-month-olds (or even 15-month-olds) represent either proper names or count nouns in an adult-like fashion. The findings do not show that children generalize a count noun across instances of an object category because they are members of that category (rather than, say, because they share a property or properties). Furthermore, the results do not reveal that children restrict a proper name to an individual object because it is that particular individual (rather than, say, because it has a particular property or properties, or because it is the sole member of a restricted object category). I will return to this issue later in the paper. The existing data do, however, provide evidence that infants distinguish semantically between proper names and count nouns from the beginning of lexical development, in a manner that is at least consistent with a mature understanding of these expressions.

The findings I have reviewed pertain to children’s earliest knowledge of actual proper names and count nouns, but there are also experimental results that bear on the question of whether young infants have the capacity to learn novel words from these classes. Several experimental studies have provided evidence that infants interpret novel object words as extendible across members of an object category, in the manner of count nouns, soon after their first birthday (e.g. Booth and Waxman, 2003; Markman and Jaswal, 2004; Woodward, Markman and Fitzsimmons, 1994). For example, Woodward et al. (1994) taught 13- and 18-month-olds a novel label (e.g. ‘TOMA’) for a novel artifact (e.g. a large plastic paper clip). The authors assessed whether infants learned the word, by asking them to choose a referent after
pairing the labeled object with an out-of-category foil (e.g. a small plastic strainer). Infants in both age groups tended to choose the labeled object, revealing that they had indeed learned the word. The authors also administered a generalization trial, on which they asked for a referent after pairing another instance of the labeled object category (e.g. a different-colored paper clip) with an out-of-category foil. Infants in both age groups tended to select the object from the labeled object category, indicating that they thought the word was extendible across instances of that category.

The experimental literature also contains some limited evidence that younger infants interpret novel object words as restricted to specific individuals, in the manner of proper names. Hirsh-Pasek, Golinkoff, Hennon, and Maguire (2004) described an experiment first reported by Hennon, Rocroi, Chung, Hollich, Driscoll, Hirsh-Pasek, and Golinkoff (1999) and Hennon, Hirsh-Pasek, Golinkoff, Rocroi, Arnold, Maguire, Baker, and Driscoll (2000). These researchers gave a novel label to a novel artifact (a lemon reamer). They first assessed whether infants learned the word, by asking them to look at a referent of the term, after pairing the labeled object with an out-of-category foil (a razor holder). Hirsh-Pasek et al. reported that the majority of infants in all age groups (10-, 12-, 14-, 19- and 24-month-olds) learned the word, preferring to look at the labeled object. According to Hennon et al. (2000), however, this majority was only 50% to 60% of the 10- to 19-month-olds.

The authors then administered two further trials, in a counterbalanced order across infants. One was a proper name trial, designed to assess whether infants interpreted the word as a label for the individual object. On this trial, the experimenter asked infants to look at a referent of the term, after pairing the labeled object with another instance of the object category (a different-colored lemon reamer). The other was a generalization trial, designed to assess whether infants interpreted the word as extending to a new instance of the labeled object category. On this trial, the experimenter asked infants to look at a referent of the term, after pairing the new instance of the labeled object category (the different-colored lemon reamer) with the out-of-category foil. Hirsh-Pasek et al. (2004) reported that older infants (19- and 24-month-olds) who learned the word appeared to treat it as extending across instances of the labeled object category (i.e. as a count noun): They showed no looking preference on the proper name trial and preferred to look at the new instance of the category on the generalization trial. Younger infants (10- and 12-month-olds) who learned the word, however, seemed to take the label as a term for the individual object (i.e. as a proper name): They preferred to look at the labeled object on the proper name trial and showed no looking preference on the generalization trial. Based on these findings, the authors proposed that young infants (i.e. 10- and 12-month-olds) interpret novel object words as proper names.

Hirsh-Pasek et al.’s (2004) proposal is problematic. First, the fact that almost half the 10- and 12-month-olds failed to learn the novel word raises serious questions about the claim’s generality. Second, for those 10- and 12-month-olds who did
appear to learn the word, Hennon et al. (2000) reported that there were trial order effects. Those infants who received the proper name trial before the generalization trial tended to demonstrate a proper name interpretation, but those who saw the trials in the reverse order tended to show a count noun interpretation. The latter result is consistent with an observation made by Markman and Jaswal (2004) in their criticism of the design of this experiment: The administration of the generalization trial provides evidence that the novel word is not a proper name, because it implies that the novel word extends to one of two objects, neither of which received the label originally. The existence of these trial order effects indicates that the authors’ claim applies to a very restricted subset of 10- and 12-month-olds. For these reasons, I believe the results offer only limited support for the proposal that young infants interpret novel object words as proper names.

Markman and Jaswal (2004) reported the results of an experiment by Markman, with a design similar to that of the Hennon et al. (1999, 2000) experiment, involving a proper name trial but no generalization trial. In this experiment, 13-month-old infants (slightly older than Hennon et al.’s younger infants) failed to show clear evidence of learning of the novel object label, leading Markman and Jaswal simply to note that the results from these infants on the proper name trial were ambiguous. Markman found, however, that 15- and 18-month-olds both learned the word and extended it to another similar object on the proper name trial, suggesting that they interpreted it in the manner of a count noun. Together, Hennon et al.’s and Markman’s findings offer at best qualified support for the proposal that infants aged 13 months or younger interpret novel object words as proper names. I do not, however, think that the evidence from these experiments implies that young infants lack the ability to interpret novel object words as proper names. As I discuss later, one possible reason for the difficulty in documenting novel proper name learning in experiments like these has to do with the experimental stimuli, which were not people or human surrogates.

In light of the evidence suggesting that infants acquire both proper names and count nouns early in development, it is perhaps not surprising that children appear to learn at a young age how words from these two lexical classes are expressed in their native language. In a seminal study by Katz, Baker and Macnamara (1974; see also Macnamara, 1982), children heard a speaker provide a novel label for a doll. The experimenter modeled the word linguistically either as a proper name (e.g. ‘This is ZAV’) or as a count noun (e.g. ‘This is a ZAV’). Children then saw the labeled doll presented along with a second doll that differed in hair and dress color. The experimenter then asked children to choose one of the two dolls as a referent of the word, in response to a request like ‘Give me ZAV’ (if they had heard a proper name) or ‘Give me a ZAV’ (if they had heard a count noun). If children understood the appropriate semantic distinction between novel words presented linguistically as proper names and those presented as count nouns, they should have picked the labeled doll systematically if they heard a proper name (interpreting it as a term for the individual object), but they should have selected the two dolls
equally often if they heard a count noun (interpreting it as a term for the object category). Katz et al. (see also Macnamara) observed this pattern of results in girls as young as 17 months, and in boys as young as 28 months.

Several subsequent studies have attempted to rule out alternative interpretations of young children’s performance in the original Katz et al. (1974) study. For example, Gelman and Taylor (1984) sought to clarify whether children’s tendency to generalize the novel count noun to the second object in the original task reflected an object category interpretation or mere confusion. They revised the task by adding two out-of-category foils to the pair of objects from the labeled object category, giving children a choice among four possible referents of the word. They found that children who generalized the count noun tended to restrict their choices to one of the two objects of the labeled category, indicating that they had indeed made an object category interpretation.

Liittschwager and Markman (1993), Hall, Lee, and Bélanger (2001), Sorrentino (2001), and Bélanger and Hall (2006) addressed another alternative interpretation of the Katz et al. (1974) findings. These researchers aimed to clarify whether infants who restricted the novel proper name to the labeled doll in the original task interpreted the term as a label for the individual object. In the original task, recall that the second doll presented to children differed from the labeled doll in several of its features (e.g. in hair and dress color), making it possible that children who restricted the word to the labeled doll interpreted it not as an expression for the individual (a term for that doll) but as a label for one or more of its properties (a term for its hair and/or dress color) or for a restricted category of which it was one or the sole instance (a term for dolls of a particular hair and/or dress color). In one version of the revised task, Hall et al. simply replaced the different-looking second doll from the Katz et al. task with a doll that looked identical to the labeled doll. Hall et al. found that children who participated in this revised task still selected the labeled doll over the second doll when they were asked for the referent of the proper name, suggesting that they did, in fact, take the word to refer to the individual doll, rather than to any of its visible properties or to a restricted object category to which it belonged.

The original work by Katz et al. (1974) has been widely cited as providing evidence that very young infants—17-month-old girls—have learned the appropriate semantic distinction between novel words modeled linguistically as proper names and those presented as count nouns. In light of this fact, it is notable that subsequent investigations using revised versions of the task designed to clarify infants’ interpretation of the proper name have failed to find evidence of knowledge of the distinction between proper names and count nouns in either girls or boys younger than 23 months (when the dependent measure was pointing/reaching, as in the original task; Hall et al., 2001), or younger than 20 months (when the dependent measure was looking time; Bélanger and Hall, 2006). Furthermore, my colleagues and I have recently failed to find evidence of knowledge of an appropriate semantic distinction between novel proper names and novel count nouns before
20 months, in a looking-time task examining infants' use of lexical class differences to guide their object individuation (i.e. their counting of objects present in an ambiguous scene; Hall, Corrigall, Rhemtulla, Donegan and Xu, 2008).

To identify the source of the discrepancy between results based on the original Katz et al. (1974) task and those based on the revised task, Hall and Bélanger (2009a) conducted a comprehensive study in which the same infants took part in both the original Katz et al. task (involving different-looking objects) and Hall et al.'s (2001) version of the revised task (involving identical-looking objects). We tested different groups of infants at 14, 17, 20, and 23 months. In each age group, infants participated in either the proper name condition (in which we modeled a novel word for a doll as a proper name) or the count noun condition (in which we modeled the same word for the same doll as a count noun). All infants took part in two trials. We based the contrast trial on the original Katz et al. task: The labeled doll was paired with a different-looking doll. We based the identical trial on the Hall et al. task: The same labeled doll was paired with an identical-looking doll. On both trials, we asked infants to find a referent of the word, by choosing one of the two dolls.

The results clearly replicated the previously observed difference between the age of earliest success in the original task (with different-looking objects) and the age of earliest success in the revised task (with identical-looking objects), despite the fact that all infants in this study took part in both tasks. Overall, we found that the 14- and 17-month-olds did not distinguish significantly between proper names and count nouns, but that the 20- and 23-month-olds did. This finding is consistent with prior results using the revised task. When, however, we broke down the data in the proper name condition, in order to look at infants' choices on the contrast and identical trials separately, we observed a striking result. Infants' earliest tendency to select the labeled doll systematically on the contrast trial occurred at 17 months, but their earliest tendency to do so on the identical trial did not occur until 23 months. Our results were thus consistent not only with Katz et al.'s (1974) finding with 17-month-old girls tested on the original task (a finding that we extended for the first time to include boys), but also with Hall et al.'s (2001) finding with 23-month-olds tested on the revised task. These findings indicate that the previously observed age difference was not due to methodological differences between studies using the different tasks.

The findings from Hall and Bélanger (2009a) confirm and extend the seminal results of Katz et al. (1974), suggesting that infants first learn a semantic distinction between novel words presented as proper names and those presented as count nouns at 17 months. At the same time, the results suggest a further development in infants' understanding of novel proper names between 17 and 23 months. The nature of this development is not yet clear. It is possible that the change involves a representational discontinuity: 17-month-olds, unlike 23-month-olds, may represent proper names as referring to properties or restricted object categories, rather than to individual objects. It is also possible, however, that both 17-month-olds and 23-month-olds interpret proper names as labels for individual objects, but that infants initially
expect numerically distinct individual objects to be perceptually distinctive. The
difference between 17- and 23-month-olds may thus stem from the older infants’
more advanced skill in using spatio-temporal information (cues from an object’s
movements through space and time) to keep track of an individual object in the
presence of another object that looks identical (e.g. an identical twin or an exact
copy) (see Hall and Bélanger, 2009a, for further discussion).

Although it seems that infants learn the appropriate semantic distinction between
novel words presented linguistically as proper names and those presented as count
nouns before their second birthday, I will briefly describe one further line of
research suggesting that their understanding of words modeled linguistically as
proper names undergoes further development after age two. Hall, Waxman,
Brédart and Nicolay (2003) conducted a series of experiments with preschoolers,
inspired by the observation that there is often a close relation between proper
names and descriptions. To take one familiar example, English surnames, which
first arose during the Middle Ages, typically originated as terms (accurately)
describing individuals’ occupations (‘Carpenter’, ‘Taylor’), places of dwelling
(‘Woods’, ‘Hills’), physical characteristics (‘Short’, ‘White’), or family relationships
(‘Johnson’, ‘Davidson’). Many people today have nicknames that are accurately
descriptive, like ‘Shorty’ or ‘Curly’. Furthermore, many characters in children’s
television programs, films, and books have accurately descriptive names, as in the
blue dog, ‘Blue’, from the television show, ‘Blue’s Clues’, or the happy dwarf,
‘Happy’, from ‘Snow White and the Seven Dwarves’. Despite its possible origin as
an object description, however, the role of a proper name is to label an individual
object, not to label one or more of its properties (Kripke, 1980).

In Hall et al. (2003), we asked whether preschool-aged children understand that
words modeled linguistically as proper names and containing descriptions (descriptive
proper names) function to label individual objects rather than to describe them. On
one trial of our task, children saw a drawing of an unfamiliar cartoon character with
a salient property—it was red. We then labeled this character and told children a
story about how it fell into some yucky green stuff and ended up entirely green. We
showed children a drawing of the now-green character. Next we paired the now-
green original character with a second unfamiliar cartoon character of a different
kind (i.e. with a different body shape) but having the same salient property as the
original character at the time of labeling—it was red. Finally, we asked children
to choose one of the two objects as a referent of the label we gave to the original
character.

Children took part in one of three conditions. In the non-descriptive proper name
condition, we modeled the label for the original object as a proper name with
no (relevant) descriptive content (e.g. ‘This is Mr. Smith’). When we asked for a
referent of the word in this condition (‘Find Mr. Smith’), both 3- and 4-year-olds
overwhelmingly chose the now-green original character. In the adjective condition,
we modeled the label for the original object as an adjective that accurately described
its salient property at the time of labeling (e.g. ‘This is a red one’). When we
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requested a referent of the word in this condition (‘Find a red one’), 3- and 4-year-olds tended to select the second (red) character. Our greatest interest was in the third condition, the descriptive proper name condition, in which we modeled the label as a proper name that contained an accurate description at the time of labeling (e.g. ‘This is Mr. Red’). When we asked for a referent of the word in this condition (‘Find Mr. Red’), 3-year-olds tended to select the second (red) character, but 4-year-olds showed a significant tendency to select the now-green original character—the same individual object that received the label initially. By the age of four years, children’s knowledge that words modeled as proper names label individual objects is thus so robust that it enables them to ignore conflicting descriptive information in order to interpret and extend descriptive proper names appropriately.

To summarize this section: The acquisition of knowledge about proper names follows a clear time course. Before the age of one year, infants first appear to show comprehension of some proper names as well as some count nouns. At around one year or soon thereafter, they begin to produce some proper names, as well as some count nouns. Also around this time, they show an ability to learn novel count nouns and (perhaps) novel proper names in laboratory experiments. By 17 months, infants learn to distinguish semantically between novel proper names and novel count nouns in word extension tasks involving perceptually contrasting objects. By 20 to 23 months, they learn to distinguish semantically between novel proper names and novel count nouns in extension tasks involving identical-looking objects. By four years, they interpret words modeled as proper names as labeling individual objects, even in the challenging situation in which the word contains a false (and potentially conflicting) description. For the purposes of what follows, the principal point I stress is that infants’ early learning of the linguistic expression of proper names in their language appears to follow from an antecedent ability to learn words from two distinct semantic classes: terms that apply to specific objects and terms that extend across object category members. This ability appears to be present from the outset of lexical development, and it is consistent with an appropriate understanding of proper names and count nouns.

2.2 The Referents of Infants’ First Proper Names

A second notable feature of infants’ early proper name learning pertains to the particular object category to which the referents typically belong. Parental reports indicate that infants’ first proper names are usually words for people, specifically parents, other family members, and family friends; in contrast, their first count nouns are typically words for objects from other object categories, including animals, body parts, and especially artifacts (such as balls, cups, and cars) (e.g. Dromi, 1987; Fenson et al., 1994; Macnamara, 1982; Nelson, 1973; Tardif et al., 2008). In addition, the experimental demonstration of young infants’ understanding of proper names focused on words for people (infants’ own mothers and fathers) (Tincoff and Jusczyk, 1999), whereas the experimental demonstration of young
infants’ understanding of count nouns focused on words for body parts (novel exemplars of an adult’s hands and feet) (Tincoff and Jusczyk, 2000). Moreover, experimental demonstrations of infants’ early learning of novel count nouns have involved artifacts as stimuli (e.g. Woodward et al., 1994). This difference between the referents of infants’ initial proper names and the referents of their earliest count nouns is a second key feature of early object word learning I wish to highlight and to which I return later.

3. How Do Children Learn Proper Names?

In the preceding section, I described some properties of infants’ early acquisition of proper names, in an effort to make two general points. First, infants appear to learn both proper names and count nouns from the outset of lexical development, and they discover how words from these two lexical classes are expressed in their language at an early age. Second, infants’ initial proper names are usually words for people, whereas their first count nouns tend to be words for objects from other object categories, such as artifacts. I now draw on these points in evaluating theoretical accounts of how children initially identify proper names in their mother tongue and subsequently learn their language-specific properties. I first consider two well-known accounts of object word learning. Borrowing terminology from Hirsh-Pasek et al. (2004), I call them the narrow-to-broad and the broad-to-narrow accounts. I describe what specific versions of each of these accounts predict about early proper name learning, noting their difficulty in explaining the facts I have just reviewed. I then turn to a third account of object word learning, calling it narrow-and-broad. I describe what one particular version of this account predicts about the learning of proper names, emphasizing its success in explaining the facts about early proper name learning, and I discuss some implications of this success for our understanding of lexical development.

3.1 Narrow-to-Broad Account

The narrow-to-broad account posits that infants have an initial bias to interpret all object words as labels for individual objects. To learn that some object words are terms for object categories, infants must overcome this initial constraint. Versions of this account have been endorsed by empiricist philosophers as well as by contemporary developmental psychologists.

Among philosophers, John Locke (1690/1959) argued for a version of a narrow-to-broad account of object word learning:

There is nothing more evident, than that the ideas of the persons children converse with (to instance in them alone) are, like the persons themselves, only particular. The ideas of the nurse and the mother are well framed in their minds; and, like pictures of them there, represent only those individuals. The names
they first give to them are confined to these individuals; and the names of *nurse* and *mamma*, the child uses, determine themselves to those persons. Afterwards, when time and a larger acquaintance have made them observe that there are a great many other things in the world, that in some common agreement of shape, and several other qualities, resemble their father and mother, and those persons they have been used to, they frame an idea, which they find those many particulars do partake in; and to that they give, with others, the name *man*, for example. And thus they come to have a general name, and a general idea ([*An Essay Concerning Human Understanding*, Book III, ch. 3 §7]).

In the current psychological literature, several developmental researchers have defended a version of this account, in at least some of their writings (e.g. Hennon *et al.*, 1999, 2000; Hirsh-Pasek *et al.*, 2004; Nelson, 1973; Smith, 2000). For example, Hirsh-Pasek *et al.* wrote:

... infants are conservative word learners who ... do not readily extend a word to a category of objects, actions, or events. Word extension ... may ... come about only through experience (Hirsh-Pasek *et al.*, 2004, p. 194).

Hennon *et al.* (2000) elaborated on this proposal, writing:

Young children will default to the proper noun hypothesis if given any opportunity to use it. Older, more sophisticated word learners have learned that the default is the opposite: Words label categories (p. 19).

Hennon *et al.* (2000) further argued that it is specifically through perceptual, social, and linguistic experience that infants learn that object words should, as a default, be extended across objects of a particular category. Under this proposal, one simple way for infants to identify and learn the linguistic properties of proper names in their language would be by monitoring their parents’ acts of labeling objects at the outset of lexical development, provided that parents initially used proper names to label all objects for their infants.

One straightforward prediction of Hennon *et al.*’s (1999, 2000) and Hirsh-Pasek *et al.*’s (2004) narrow-to-broad account is that the object words in infants’ earliest lexicons should be labels for individual objects (i.e. proper names). This prediction is not supported by the facts I have just reviewed about early object word learning. As I have just discussed, infants’ earliest receptive and productive lexicons appear to contain both proper names and count nouns (i.e. terms for specific objects and terms that extend across object category members). Furthermore, the experimental results purporting to show that infants initially interpret novel object words as proper names are limited, and other experimental findings suggest that, as soon as infants show clear learning of novel object words, they interpret them as extendible, in the manner of count nouns. Moreover, this narrow-to-broad account offers no
explanation for the fact that infants’ first proper names are usually words for people, while their initial count nouns tend to be labels for objects from other object categories. Under this narrow-to-broad account, the restricted set of referents for which infants initially learn proper names is thus hard to understand. I believe these concerns cast doubt on the validity of the narrow-to-broad account of early object word learning.

3.2 Broad-to-Narrow Account
The broad-to-narrow account holds that object word learning follows a course opposite to the one proposed under the narrow-to-broad account: Infants initially assume that all object words should be extended broadly across objects (e.g. to all objects from the same object category, as in the case of count nouns). To learn words for individual objects, infants must override this initial assumption.

Several developmental psychologists have argued in favor of a version of this account. For example, Waxman and Booth (and their colleagues) have defended a version of the broad-to-narrow account, whereby words function initially as ‘invitations to form categories’ (e.g. Waxman and Markow, 1995; see also Waxman, 2004). Booth and Waxman (2003) summarized their proposal in this way:

We have argued (a) that infants begin the task of word learning with a broad initial expectation that links novel open class words (otherwise independent of their grammatical form) to commonalities among named objects, and (b) that this initial expectation is subsequently fine-tuned as infants gain experience with the specific correlations between particular grammatical forms and their associated meaning in the native language (p. 358).

According to this proposal, infants hold a starting bias to interpret all (lexical) object words as labeling categories that are organized around any of a number of properties (including object-category-relevant properties, like shape, and other properties, like color). From this initial state, infants first learn that some object words (count nouns) are terms specifically for object categories, by noticing correlations between parents’ use of certain words and the presence of objects that share certain types of commonalities (i.e. object-category-based commonalities, such as shape). At some point subsequent to this initial learning, infants must discover through a similar process of correlation-detection that other object words (proper names) are labels for individual objects, further refining their initial bias. Under this proposal, infants could identify and learn the properties of proper names in their language if they could keep track of parental uses of object labels that were restricted to individual objects, and if parents used proper names in those circumstances. In addition, infants would require some mechanism to override the general tendency to assume that all object words label some type of commonality among objects.

Markman’s ‘constraints on word learning’ framework is another well-known version of the broad-to-narrow account (e.g. Markman, 1989; Woodward and
Markman, 1998). Under this version, learners’ initial bias is to assume that words for objects label categories of whole objects. Markman and Jaswal (2004) noted the problem that infants face in learning proper names under such an account:

Deciding that a name refers to an individual poses a challenge because of the taxonomic assumption, a word-learning constraint that motivates children to extend newly learned labels to other members of like kind... Using this assumption, children would run into trouble in learning proper names. How is it that children come to treat proper names as referring to individuals if, on the taxonomic assumption, they expect labels to refer to kinds? (pp. 175–176).

Under Markman’s proposal, infants could identify and learn the linguistic properties of proper names if they had some way to override the constraint that all object labels be interpreted as object category words, and if they had some further way to identify which words in parental speech were labels for individual objects. Infants’ success would, of course, depend on parents’ using proper names to label objects under the circumstances in which infants interpreted the labels as terms for individual objects.

There is good evidence to support the broad-to-narrow account of object word learning. I now describe two experimental demonstrations that support the claim that young children have a bias to interpret object words as object category terms, as well as the ability to override this bias in order to learn words as labels for individual objects. These demonstrations show how infants might learn proper names under Markman’s version of the account, and they are relevant for thinking about how infants might do so under Waxman and Booth’s version. One demonstration involves children’s use of another hypothesized word-learning constraint within Markman’s framework, called mutual exclusivity; the other implicates children’s reliance on pragmatic knowledge and the ability to track parental use of words (or the failure to use words) across multiple objects.

3.2.1 Using Mutual Exclusivity to Learn Proper Names. One way in which young children might override Markman’s taxonomic constraint in order to learn proper names is by invoking another word learning constraint in her theoretical framework, called mutual exclusivity. The mutual exclusivity constraint is the bias to assume that an object can belong to only one object category (i.e. have only one associated count noun). According to this constraint, if infants have learned a count noun for an object, they are released from the taxonomic constraint and may interpret a subsequent object word as a proper name for the individual object.

In some of my own work, I have obtained evidence that young children can use the mutual exclusivity constraint to learn words for individual objects (Hall, 1991; Hall and Bélanger, 2009b). In Hall and Bélanger (2009b), we showed 23-month-old infants a small stuffed animal and provided a novel label presented linguistically as a proper name (i.e. ‘This is called DAXY’). We then presented a second stuffed
animal from the same object category. On the contrast trial, this second animal
looked perceptually different from the labeled object (i.e. it was a different color);
on the identical trial, it looked identical to the labeled object. On both trials, we
asked children to choose one of the two objects as a referent of the word (i.e.
‘Give me DAXY’). Children participated in one of two conditions. In the unfamiliar
condition, the animals were novel creatures, in the sense that children did not know
a count noun for the object category. In this condition, children chose the labeled
object about half the time on both contrast and identical trials. In other words, they
appeared to treat the word as a count noun for the object category, consistent with
the taxonomic constraint. In the familiar condition, the animals were rabbits, objects
for which all children knew a count noun for the object category (i.e. the word
‘rabbit’ or ‘bunny’). In this condition, children systematically chose the labeled
object on both contrast and identical trials, indicating that they interpreted the label
as a proper name for the individual object. These results thus reveal that children
are more likely to learn a proper name for an object for which they know a count
noun than for a object for which they do not, consistent with their using mutual
exclusivity to override the taxonomic constraint. The mutual exclusivity constraint
thus appears to provide 23-month-olds with a way to move from interpreting
object words as object category terms to interpreting them as labels for individual
objects. It remains an important unanswered question whether infants can use this
constraint to drive the learning of proper names closer to the beginning of lexical
development.

Although the mutual exclusivity constraint could help learners to override an
object category constraint, it could not by itself direct them specifically to interpret
a novel word as a proper name for an individual object. For example, they might
also interpret the word as an adjective labeling one of the object’s properties, such
as its color or texture. One way for learners to determine that a novel word for a
familiar object is a label for the individual object rather than a label for an object
property would be to keep track of the word’s range of reference—the number of
objects for which speakers used the label. Children might reasonably expect that
proper names, being terms for individual objects, would be used in conjunction
with only one object, even though they must eventually learn that some proper
names are used for multiple individuals (e.g. two dogs might both be named
‘Freddie’) (see Macnamara, 1982). Children might, however, expect that adjectives
would be used in conjunction with any number of objects that bear the appropriate
property.

My colleagues and I have found evidence that young learners can use range-of-
reference information in order to specify that a novel word for a familiar object
is a proper name rather than an adjective (Hall, 1996; Hall and Bélanger, 2005).
In one part of the experiment reported in Hall and Bélanger (2005), we assigned
children to one of two conditions. In both conditions, 2.5-year-old children saw
two familiar identical-looking stuffed animals (i.e. two identical-looking yellow
rabbits, for which children knew the count noun ‘rabbit’ or ‘bunny’). In the
one exemplar condition, we labeled only the first rabbit, saying, ‘DAXY!’ We did not label the second rabbit, simply pointing to it and saying, ‘Look!’ In the two exemplars condition, we labeled both the first and the second rabbits (i.e. ‘DAXY!’ and ‘DAXY!’). We then moved the first rabbit (which had received a label in both conditions) to a new location, where we introduced a third identical-looking rabbit. We asked children to ‘Find DAXY!’, giving them a choice between the first and third objects. Children in the one exemplar condition systematically chose the first rabbit, suggesting that they interpreted the word as a proper name for the individual object. Children in the two exemplars condition, however, chose randomly between the first and third rabbits, suggesting that they interpreted the word as extending across instances of the object category, possibly in the manner of an adjective like ‘yellow’. These findings suggest that children can keep track of information about the number of objects to which a speaker applies a novel word and use this information (along with the mutual exclusivity constraint) as a cue to help them decide when a novel word is a proper name for an individual object. It remains an open question whether infants can use these sources of information to guide their interpretation of words at the outset of lexical development.

3.2.2 Using Pragmatics and Statistics to Learn Proper Names.
Markman and Jaswal (2004) have suggested another way in which children, under Markman’s broad-to-narrow account, might learn that some object words are proper names, without invoking mutual exclusivity. If children do not need mutual exclusivity to learn a proper name within this framework, they would be able to learn one of these expressions for an object even prior to learning a count noun for it (i.e. from the outset of word learning). As discussed earlier, the taxonomic constraint in Markman’s framework drives children to interpret words for objects as count nouns, extending across instances of an object category. Markman and Jaswal have proposed that children might be able to use pragmatic and statistical knowledge to override the taxonomic assumption in order to learn proper names. Their idea is that children might use the information that a speaker failed to extend a novel word from one unfamiliar object to other instances of the object category (when the speaker had the opportunity and intent to refer to them) as pragmatic evidence that the word does not, in fact, apply to those other instances (i.e. that the taxonomic constraint should be overridden) and that the label should be reanalyzed as a proper name for the labeled object.

My colleagues and I have recently gathered some preliminary experimental evidence that supports Markman and Jaswal’s (2004) proposal (Hall and Rhemtulla, in preparation). In one of our experiments, 3- and 4-year-old children took part in one of three conditions. In the one referent alone condition, children heard a novel word for an unfamiliar stuffed animal (i.e. a monster-like creature) presented by itself. In the one referent in a pair–ignore condition, children heard the same word for the same creature, but the labeled creature was presented alongside another creature of the same object category. The experimenter failed to label this second creature and, in fact, she ignored it. In the one referent in a pair–refer condition, the
procedure was the same as that in the one referent in a pair–ignore condition, except that the experimenter did not ignore the second creature. Instead, she drew the child’s attention to it, saying ‘Look!’ In all conditions, we then introduced a third creature that looked identical to the labeled creature, and we asked children to select a referent of the word, giving them a choice between the labeled creature and the third creature. Children chose differently in the different conditions. In both the one referent alone and the one referent in a pair–ignore conditions, children selected randomly between the creatures, suggesting that they interpreted the word as a count noun, extendible across instances of the object category (as in the unfamiliar condition from Hall and Bélanger, 2009b). In the one referent in a pair–refer condition, however, children systematically chose the labeled creature, suggesting that they interpreted the word as a proper name for the labeled object.

The preceding findings are consistent with Markman and Jaswal’s (2004) proposal. According to this proposal, children in the one referent alone condition would have assumed that the word for the single unfamiliar object was a count noun for the object category, in accordance with the taxonomic constraint. Children in the one referent in a pair–ignore condition would also have made this assumption. Children in this condition, moreover, would not have viewed the experimenter’s failure to label the second object with the expected word as pragmatic evidence that the label did not apply to it, because she showed no intent to refer to it. As a result, children would have had no grounds for overriding the taxonomic constraint. Children in the one referent in a pair–refer condition would initially have analyzed the word as a count noun for the object category, in accordance with the taxonomic assumption. Children in this condition, however, would have taken the experimenter’s failure to label the second creature with the expected word as a pragmatic cue indicating that the label did not apply to it, because she showed a clear intent to refer to it (i.e. when she said, ‘Look!’). As a result, children would have had cause to override the taxonomic constraint and reanalyze the label as a proper name for the individual object. Under Markman’s broad-to-narrow account of lexical development, then, it appears that learners may move from interpreting words as object category terms to interpreting them as individual object terms by using pragmatic knowledge (about the intent behind speakers’ failure to label objects with an expected label), along with an ability to keep track of speakers’ use and non-use of labels across encounters with multiple objects. My colleagues and I are currently examining whether children closer to the outset of lexical development also have the ability to learn proper names for unfamiliar objects using these types of understanding (Hall and Rhemtulla, in preparation).

The preceding demonstrations provide evidence not only that young word learners have a bias to make a broad (object category) interpretation of novel object words for certain unfamiliar objects, but also that they have the ability to override this bias in order to make a narrow (individual object) interpretation. The findings thus offer support for Markman’s broad-to-narrow account of object word learning. Yet despite these results, the facts I reviewed in the previous section...
raise questions about whether a broad-to-narrow account is true more generally. Recall that Markman’s version of this account posits that children have a bias to interpret all object words as object category terms, and that children must surmount this bias in order to learn terms for individual objects (e.g. through use of the mutual exclusivity constraint or pragmatic and statistical knowledge). This broad-to-narrow account thus makes the straightforward prediction that children’s earliest object words should be object category terms (i.e. count nouns), and that children should not learn proper names for objects until after they can use either mutual exclusivity or statistical and pragmatic knowledge to overcome the taxonomic constraint. Waxman and Booth’s version of the broad-to-narrow account makes the similar prediction that children should learn count nouns prior to proper names.

The facts of early object word learning do not appear to be consistent with the preceding prediction of the broad-to-narrow accounts. As noted earlier, children appear to learn both proper names and count nouns (i.e. terms for specific objects and terms that generalize across object category members) from the outset of lexical development. In addition, they appear to acquire proper names for some objects (‘Mommy’ and ‘Daddy’) before acquiring corresponding count nouns (‘person’, ‘people’, ‘man’, or ‘woman’) (Fenson et al., 1994). If infants learn a proper name for an object before a count noun, then they could not be using a constraint like mutual exclusivity, even if it were available to them in the initial stages of word learning (for evidence of infants’ early use of the mutual exclusivity constraint, see Markman, Wasow and Hansen, 2003). Furthermore, the roughly simultaneous appearance of proper names and count nouns in infants’ earliest lexicons seems problematic for the proposal that infants learn proper names through a process of reanalyzing count nouns, using pragmatic and statistical knowledge. Even if young infants had the knowledge required to drive this process, I suspect that the use of the process would result in proper names’ appearing later than count nouns in children’s lexicons. Finally, the broad-to-narrow account does not offer insight into why infants’ first proper names are words for people, whereas their initial count nouns tend to be labels for objects from other categories, such as artifacts. I believe that these concerns raise doubts that, in the general case, object word learning follows a broad-to-narrow course.

3.3 Narrow-and-Broad Account

I turn now to an account that does not suffer from the problems facing the two preceding accounts in explaining the facts of early object word learning. Unlike the two previous accounts, this third account—which I call narrow-and-broad—posits that infants approach the task of word learning without constraints that limit their ability to learn either all count nouns (narrow-to-broad account) or all proper names (broad-to-narrow account). What determines the interpretation of an object word in any particular case follows from infants’ knowledge that some expressions in their language label individual objects and others label object categories, in
conjunction with additional types of knowledge, such as conceptual biases. Several developmental psychologists have defended versions of this account (e.g. Bloom, 1994, 2000; Macnamara, 1982; Prasada, 2001).

Macnamara’s (1982) version of the narrow-and-broad account contains a particularly clear and straightforward proposal about the early learning of proper names and count nouns. Macnamara described his view as follows:

... by the time the child comes to learn language, he has already learned that objects in certain categories are important as individuals; those in other categories are merely exemplars of the category. Person is the pre-eminent category of the first sort, and when he is introduced to one, he will take the word applied to that person as a proper name. Words applied to objects in most other categories he will take as a sortal [count noun] (p. 30).

Under Macnamara’s proposal, infants could initially identify and subsequently learn the properties of proper names in their language by relying on a conceptual bias to construe objects in certain categories (in particular, people) as individual objects in their own right. As a consequence, infants would interpret novel words for them as proper names. Furthermore, infants could find and learn the linguistic expression of count nouns by using a conceptual bias to construe objects in most other categories as mere instances of the categories. Infants would thus interpret words for them as count nouns. Under this proposal, infants’ success hinges on caregivers’ tendency during early lexical development both to label people (and any other objects that children construe as individuals in their own right) using proper names and to label objects from other categories using count nouns.

Macnamara’s (1982) proposal that young children possess conceptual biases that lead them to construe people—but not objects from most other categories—as individual objects receives independent support from findings in cognitive development and developmental cognitive neuroscience. In the recent cognitive developmental literature, there is extensive evidence that young children reason differently about people and inanimate objects (artifacts) (e.g. Bonatti, Frot, Zangl and Mehler, 2002; Kuhlmeier, Bloom and Wynn, 2004; for a review, see Rakison and Poulin-Dubois, 2001). Of particular relevance to the current discussion, infants as young as six months of age appear to view people, but not many other objects (such as artifacts), as goal-directed agents, entities whose individuality is clearly important in its own right (e.g. Bloom, 2004; Carey, 2009). Furthermore, recent results from the literature on developmental cognitive neuroscience indicate that 6-month-olds represent human faces and inanimate objects differently in the brain. Specifically, they represent specific featural information for faces, whereas they represent spatio-temporal information for inanimate objects (Southgate, Csibra and Kaufman, 2008). Such findings suggest the possibility that people (or faces) are especially good candidates for receiving labels as individual objects.
The proposal that conceptual biases—rather than lexical constraints—drive early object word learning implies a straightforward solution to the fundamental problem facing all children of identifying and learning the language-specific properties of proper names. At the same time, the proposal raises the question of how children overcome these biases in order to learn words for the dis-preferred construals (e.g. that ‘Mary’ is also ‘a person’). One way for children to accomplish this learning would be to use the knowledge they have acquired (by using the construal biases) about how proper names and count nouns are expressed in their own language. Prior to gaining this linguistic skill, however, infants would need some other way to acquire such words. In the previous section, I discussed how an infant might surmount an object category constraint, by using knowledge of the mutual exclusivity constraint or by using pragmatic and statistical knowledge. These sources of understanding could help young children to overcome a bias to interpret words for certain objects as labels for object categories, enabling them to learn proper names. There is also evidence (some of it discussed later) that infants have knowledge of an analogue of the mutual exclusivity constraint at the level of words for individual objects, leading them to assume that an object has only one proper name (e.g. Hall et al., 2008; see also Hall and Graham, 1999). Such knowledge could help infants overcome a bias to interpret words for people as proper names, fostering the learning of terms for the dis-preferred construals (i.e. count nouns).

Unlike either the narrow-to-broad or the broad-to-narrow account, Macnamara’s narrow-and-broad account easily handles the facts I reviewed earlier about object word learning. The proposal correctly predicts the early appearance of both proper names and count nouns in infants’ lexicons, and it accurately predicts that early object words from these two lexical classes will differ in terms of their referents. Proper names for people and count nouns for artifacts (and other objects) appear at the outset of lexical development, whereas count nouns for people and proper names for artifacts seem to be less common (e.g. Fenson et al., 1994; Nelson, 1973). It is intriguing to note that, for certain objects (e.g. some animals), proper names do appear alongside corresponding count nouns in early lexicons (e.g. ‘Freddie’ and ‘dog’ for the family pet; Macnamara, 1982). There is, however, reason to expect that children will be flexible in their construal of objects from certain categories (e.g. dolls, some animals and their surrogates). Children should be easily able to construe such objects either as important individuals in their own right (e.g. because of their similarity to humans, or because of their inferred agency and social importance) or as interchangeable instances of their category (e.g. because of their difference from humans, or because of their inferred lack of agency or social importance). Indeed, much of the experimental evidence I reviewed earlier indicates that infants can flexibly learn either a count noun or a proper name for objects from certain categories (e.g. dolls, some stuffed animals). These considerations suggest that objects fall along a continuum with respect to ease of construal as individuals in their own right, with people at one end, objects like artifacts at the other, and
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objects from other categories (human surrogates, some animals and their surrogates) in the middle.

This narrow-and-broad proposal is also consistent with what we know about children’s ability to learn words for the dis-preferred construals. As noted earlier, children learn proper names for people from the outset of lexical development, but they do not learn appear to learn count nouns for the person category until months later. Furthermore, children acquire count nouns for objects from many other categories (e.g. artifacts) from the beginning of word learning, but they often fail in experiments to acquire proper names for them, even after they have become sensitive to how proper names are marked in their language. For example, recall Hall and Bélanger’s (2009b) finding that 23-month-old infants interpreted a novel word modeled linguistically as a proper name and given to a doll (a human surrogate) as a label for the individual object. In another condition from the same study, we followed exactly the same procedure, except that we tried to teach the proper name for a toy airplane. Twenty-three-month-olds in this condition failed to interpret it as referring only to the labeled individual airplane and instead extended it to another instance of the object category.

Evidence of selectivity in the object categories for whose members young children will learn proper names appears throughout the experimental literature on the learning of object words. Specifically, infants and preschoolers generally succeed in learning proper names for people and human surrogates (dolls), as well as for a variety of stuffed creatures (bears, birds, cats, dogs, dolphin-like creatures, human-like creatures, monkeys, mosquito-like creatures, penguins, rabbits, seal-like creatures, squirrel-like creatures), but they usually fail to learn proper names for objects from a number of artifact categories (balls, balloons, blocks, boats, books, bottles, cars, cups, hats, honey-dippers, kaleidoscopes, plastic blocks, plumbers’ T’s, ships, shoes, shuttlecocks, spoons, suction cups, trains, vegetable peelers, wands) (Bélanger and Hall, 2006; Gelman and Taylor, 1984; Hall, 1991, 1994, 1996; Hall and Bélanger, 2005, 2009a, 2009b; Hall and Graham, 1999; Hall et al., 2001; Imai and Haryu, 2001; Jaswal and Markman, 2001; Katz et al., 1974; Leung and Hall, in preparation; Liittschwager and Markman, 1993; Macnamara, 1982; Sorrentino, 1999).

The proper-namable objects listed in the preceding paragraph are all human or animal surrogates, whereas the non-proper-namable objects are all artifacts, yet it is a challenge to specify the precise criterion underlying children’s decision to interpret an object word as a proper name. First, the criterion may change with age. The scope of children’s category of proper-namable things broadens over the course of development (Hall, Veltkamp and Turkel, 2004). Second, the criterion may be abstract. On the one hand, Hall (1994) has found that preschool children will not interpret a novel word as a proper name for certain animals (i.e. insects, such as a spider, a bee, and a caterpillar), unless they are described as being the speaker’s pets. On the other hand, Sorrentino (1999) has discovered that preschool children (or at least, preschool girls) will take a proper name as a label for an individual artifact.
(e.g. a lamp-like object) if the object is described as possessing mental states. It is as yet unclear whether infants’ initial criterion is as abstract as that of preschoolers, or whether infants’ starting bias is to construed only people as individuals in their own right, meriting reference by proper names.

In an ongoing study, my colleague and I have recently obtained direct but still preliminary support for this narrow-and-broad view of object word learning (Leung and Hall, in preparation). In three experiments, we are investigating how infants early in the process of lexical development interpret novel words given to people and artifacts. Our interest is in whether infants interpret words for people as terms for the individual objects but interpret the same words applied under the same conditions to artifacts as terms for the object categories. Although our ultimate goal is to test infants at the very outset of lexical development, we have begun this research by testing somewhat older 16- and 17-month-olds. Infants in this age range have not yet mastered the cues that indicate how proper names and count nouns are marked in their language. As a result, data from this age group are relevant for shedding light on how infants learn the linguistic distinction between these two lexical classes.

In the first experiment, we are simply seeking evidence that infants can learn a novel word given to either a person or an artifact in our task. We are assigning infants to one of three conditions. In the people condition, they learn a word for a female human face (a stranger); in the familiar artifact condition, they learn a word for a tennis ball; in the unfamiliar artifact condition, they learn a word for an object from an unfamiliar artifact category, resembling an hourglass. In this and subsequent experiments, we are using parental report to verify that no infants in the people condition know a count noun for the person category (i.e. no word like ‘person’, ‘people’, ‘woman’, or ‘lady’); that all infants in the familiar artifact condition know the count noun ‘ball’ for the ball; and that no infants in the unfamiliar artifact condition know a count noun for the novel hourglass-shaped object. Our rationale for including both the familiar artifact and the unfamiliar artifact conditions in the design is to provide two different comparison groups for the people condition. The familiar artifact condition matches the people condition in that both balls and people are familiar to infants; the unfamiliar artifact condition matches the people condition in that infants know no count noun for either object category.

The experiment has two phases. In the familiarization phase, infants in all conditions watch a screen on which a target object is shown alongside a foil from a different object category from within the same superordinate-level category: a human face paired with the face of an animal (people condition), a tennis ball paired with a cup (familiar artifact condition), or an unfamiliar hourglass-shaped artifact paired with an unfamiliar cylindrical artifact (unfamiliar artifact condition). A recorded voice simply directs them to look at the screen, and we measure their looking time to each of the objects. In the subsequent test phase, the target object enters the now-blank screen, and the recorded voice labels it with a novel word, ‘DAXY!’ The object then moves to the other side of the screen, where it
stops. The second object then enters the scene from the side on which the target object originally appeared, and it moves to the target object’s original location. The recorded voice now asks them to look at a referent of the word. We measure how long infants look at each object in response to this request. The visual event in all three conditions has the same spatial and temporal parameters, and the audio recording of the voice is the same. In the familiarization phase, infants show no preference to look at either object in any of the three conditions; in the test phase, however, infants in all three conditions reveal a preference to look at the labeled object. These results provide an important foundation for the two experiments that follow, because they establish that infants can learn an association between a novel word and an object—either a person or an artifact—in this task.

The second experiment is identical to the first, except that we replace the foil with a second object from the same category as the target object. In the people condition, the stimuli are thus two different female human faces; in the familiar artifact condition, the stimuli are two different-colored and -patterned tennis balls; and in the unfamiliar artifact condition, the stimuli are two different-colored and -patterned hourglass-shaped objects. Under the current proposal, we predict different looking behavior in the test phase in the three conditions. If infants interpret words for people as proper names, then they should show a preference to look at the originally labeled object in the test phase of the people condition. If infants interpret words for artifacts as count nouns, then they should look equivalently at the two objects in the test phase of the two artifact conditions. (Note that infants in the familiar artifact condition might be driven by the mutual exclusivity constraint to interpret the word as an adjective for one of the target object’s properties. As a result, infants might look equivalently at the two objects, if they took the word to label a shared property. They might, however, show a preference to look at the labeled object, if they took the word to pick out one of the target object’s distinguishing properties.)

Our preliminary results are consistent with our predictions. In the familiarization phase, infants show no preference to look at the labeled object in any condition. In the test phase, however, infants show a significant preference to look at the labeled object in the people condition, but not in the two artifact conditions. At 16 and 17 months, infants thus appear to interpret a novel word given to a human face differently from the same novel word given to an artifact, restricting only the word for the human face to the labeled object, in the manner of a proper name.

The third experiment is identical to the second, except that now we ask whether infants’ different interpretations of novel words for people and artifacts—as revealed in Experiment 2—affects their interpretation of a second novel word. In this experiment, we do not ask infants to find the referent of the word they learn in the task (i.e. ‘DAXY’), but rather to locate a referent of a second novel word that they have never heard before (i.e. ‘BLICKY’). Our predictions for the test phase of this experiment are different from those for Experiment 2. In the people condition, we again expect that infants will interpret the first novel word as a proper name.
for the labeled face. We hypothesize, however, that they will invoke an analogue of the mutual exclusivity constraint at the level of words for individual objects (cf. Hall and Graham, 1999; Hall et al., 2008), interpreting the second novel word as a proper name for the second face. We thus expect them to show a preference to look at the second face in the test phase. In the artifact conditions, we expect that infants will again take the first novel word as extending to both instances of the object category, as a count noun (or perhaps, in the familiar artifact condition, as an adjective). We thus do not expect that they will have cause to invoke the mutual exclusivity constraint to guide their choice of a referent of the second word. We therefore predict that they will show no preference to look at the second artifact in the test phase. Again, our preliminary findings are consistent with these predictions. In the familiarization phase, infants show no preference to look at the labeled object in any condition. In the test phase, however, infants in the people condition show a significant preference to look at the second female face, but those in the artifact conditions show no looking preference. The results of this study provide further support for the claim that 16- and 17-month-olds interpret novel words for people differently from words for artifacts, taking only those words applied to people as terms for individual objects. The findings also offer new evidence that infants honor an analogue of the mutual exclusivity constraint in the interpretation of proper names—assuming that one object will receive only label for the individual object.

4. Summary and Conclusions

I began by describing the basic challenge confronting all infants in identifying and learning the language-specific properties of words from different lexical classes—including proper names. I then reviewed evidence pertaining to the early acquisition of proper names. I stressed not only that both proper names (i.e. terms for individual objects) and count nouns (i.e. terms that are extendible across object category members) seem to appear in children’s earliest lexicons but also that expressions from these two lexical classes initially have very different referents (generally people for proper names; objects from other categories for count nouns). I then argued that this evidence represents a challenge for two well-known accounts of object word learning: the narrow-to-broad account (positing that infants initially treat all object words as terms for individual objects), and the broad-to-narrow account (proposing that learners adhere to a constraint that all object words label object categories or broader sets of commonalities among objects). Both accounts imply a complex solution to the fundamental learning problem, one in which infants’ ability to identify and learn the linguistic properties of proper names and count nouns is hindered by an initial tendency to acquire words from only one of the lexical classes. Neither account predicts that infants’ earliest lexicons should contain both proper names and count nouns, and neither account predicts referent differences (people vs. other objects) in infants’ first individual object and object category terms.
In light of this problem, I presented and defended a version of a third account, which I called narrow-and-broad. Under this proposal, infants hold no constraints that block their overall ability to learn either proper names or count nouns. Instead, they possess the conceptual resources to learn words for either individual objects or object categories, along with conceptual biases that lead them to construe some objects (notably people) as individuals in their own right and to construe most other objects (including artifacts) as interchangeable instances of their category. These biases naturally lead children to interpret words for people as proper names and words for most other objects as count nouns. This proposal implies a straightforward solution to the fundamental learning problem, one in which infants identify tokens of both lexical classes and begin to learn their linguistic properties from the outset of word learning. The proposal correctly predicts the early appearance of both proper names and count nouns in infants’ lexicons, and it accurately predicts the observed difference in the referents of early object words from these two classes. It is also consistent with facts about later object word learning. Moreover, the proposal receives direct but preliminary support from the results of a recent set of experiments examining infants’ interpretation of novel words for people and artifacts.

The proposal that infants’ conceptual biases are a driving force behind their early proper name learning raises many questions, and answering them all will require further research. For example, what precisely is the criterion that determines infants’ initial construals and, therefore, the objects for which they can learn proper names? What is the basis for their subsequent ability to learn proper names for individuals outside the realm of physical objects (e.g. cities, streets, movies, and hurricanes)? Would the proposal receive support from data from languages other than English? And critically, do caregivers behave in a manner that would support children’s learning of the language-specific properties of proper names and count nouns via their conceptual biases? Some recent research suggests that parents do label objects for their young children in a way that dovetails with their children’s interpretative tendencies (Hall, Burns and Pawluski, 2003), but there is much room for further investigation. Such work will be invaluable, because the viability of the proposal depends not only on the existence of biases in the child but also on the presence of systematicity in the input.

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