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An image is worth a thousand words: Why nouns tend to dominate verbs in early word learning

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Abstract

Nouns are generally easier to learn than verbs (e.g., Bornstein, 2005; Bornstein et al., 2004; Gentner, 1982; Maguire, Hirsh-Pasek, & Golinkoff, 2006). Yet, verbs appear in children's earliest vocabularies, creating a seeming paradox. This paper examines one hypothesis about the difference between noun and verb acquisition. Perhaps the advantage nouns have is not a function of grammatical form class but rather related to a word's imageability. Here, word imageability ratings and form class (nouns and verbs) were correlated with age of acquisition according to the MacArthur-Bates Communicative Development Inventory (CDI) (Fenson et al., 1994). CDI age of acquisition was negatively correlated with words' imageability ratings. Further, a word's imageability contributes to the variance of the word's age of acquisition above and beyond form class, suggesting that at the beginning of word learning, imageability might be a driving factor in word learning.

Nouns tend to appear before verbs (Gentner, 1982) and to dominate English-speaking children's early lexicons (e.g., Fenson et al., 1994; Goldin-Meadow, Seligman, & Gelman, 1976). This finding has been replicated across the globe, with languages like German, Mandarin, Kaluli, Japanese, Turkish (Gentner, 1982), Spanish (Jackson-Maldonado, Thal, Marchman, Bates, & Gutierrez-Clellen, 1993), Italian (Caselli et al., 1995), French (Bassano, 2000; Parisse & Le Normand, 2000; Poulin-Dubois, Graham, & Sippola, 1995) and others (Bornstein, 2005; Bornstein et al., 2004; but see Tardif, Wellman, Fung, Liu, & Fang, 2005). Even in the laboratory, novel nouns are learned more quickly and easily than novel verbs (e.g., Childers & Tomasello, 2002; Golinkoff, Hirsh-Pasek, Bailey, & Wenger, 1992; Golinkoff, Jacquet, Hirsh-Pasek, & Nandakumar, 1996), a result also found in Japanese where verbs often appear in privileged, sentence-final positions (Imai, Haryu, & Okada, 2005) and in Chinese where verbs can appear in isolation (Hirsh-Pasek & Golinkoff, 2006; Imai et al., 2008).

Explanations for the preponderance of nouns in early vocabularies come in three forms. First, Kersten and Smith (2002) and Echols and Marti (2004) suggest an attentional explanation: Children preferentially attend to objects and prefer to map new names to objects rather than to the actions in which the objects are engaged. Only when children know the names of the objects will they go on to learn the names of the actions. Second, the disparity is based in perception: While objects are often stable in time and space, actions are fleeting and dynamic and unfold in time and space. Extracting a categorical representation

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of actions (or the "verbal essence," Golinkoff et al., 2002) is more difficult than perceiving the object categories that nouns label (see also Golinkoff & Hirsh-Pasek, 2008). Learning the name of an action requires that children perceptually abstract the invariants of the action (e.g., running) across multiple exemplars that show wide variation. For example, a toddler, Grandpa, and a dog all run, but do so in very different ways (Golinkoff et al., 2002). A final explanation has to do with input: English-speaking parents tend to request that their children *repeat* noun labels but *act out* verb meanings (Goldfield, 2000; see also Tardif, et al., 2005). Even in verb-favored Asian languages, parents talk more about objects than actions to young children (Fernald & Morikawa, 1993).

These explanations take the literature beyond simple counts of vocabulary content to possible *mechanisms* behind the differences in noun and verb acquisition. They all, however, maintain that there is something unique about the grammatical form classes "noun" and "verb" that accounts for the disparity in these word types. An alternative explanation suggests that the noun-verb disparity may not be as much about form class per se as it is about the kinds of concepts that nouns and verbs label. Two facts lead to this conjecture. First, although nouns are typically learned before verbs, some nouns like *idea* or *passenger* (Hall, 1994; Hall & Waxman, 1993) are learned after verbs like *hug* or *kiss* (Fenson et al., 1994). Second, despite a noun advantage, verbs are found even in children's earliest vocabularies (Tardif, 1996; Tomasello & Merriman 1995). In combination, these two facts suggest that another explanation for early noun dominance may be warranted.

Gentner (e.g., Gentner, 1982; Gentner & Boroditsky, 2001) suggested the "natural partitions" hypothesis: Noun dominance reflects the fact that nouns tend to label enduring entities while verbs label relational concepts. That is, objects nouns label can generally stand alone while the actions that verbs label require some agent to perform them. Further, verb referents are often not as obvious as noun referents. While early nouns typically label whole objects (Hollich, Golinkoff, & Hirsh-Pasek, 2007), verbs can encode a range of concepts such as the *path* of the action (e.g., *pull* versus *push*) or the action's *manner* (e.g. *run* versus *walk*). Children have to discern how their language typically packages verb constructs, a problem Gentner and Boroditsky (2001) referred to as "relational relativity."

Gentner and Boroditsky's (2001) work highlights a key point about differences between nouns and verbs. The concepts represented by nouns are generally (though not always) more imageable and easier to see as distinct separate entities than those represented by verbs. It is thus possible that what distinguishes nouns and verbs is not captured by the *linguistic* phenomenon of form class, but by a *conceptual* distinction between what these word classes tend to label (see Gentner & Boroditsky, 2001; Maguire, Hirsh-Pasek, & Golinkoff, 2006). One way to reveal this conceptual distinction may be to measure a word's imageability.

"Imageability" is the ease with which a concept evokes a mental image (Paivio, Yuille & Madigan, 1968). It has long been studied in psychology and is found to influence learning and memory (e.g., O'Neill, 2005; Williams, Healy, & Ellis, 1999). Imageability, while related to some other concepts, captures *unique* elements of word meaning. For example, while imageability is highly correlated with concreteness, research suggests that the correlation between imageability and concreteness is not as high as one might expect if both measure the same underlying variable (D'Angiulli, 2003–2004; Paivio et al., 1968; Richardson, 1975). A word can be highly concrete but low in imageability (i.e., originator) or high in imageability but low in concreteness (i.e., fun). Furthermore, words with high imageability and lower concreteness ratings appear to share common characteristics such as being associated with sensory experience (Paivio et al., 1968). It thus appears that the dimensions of imageability and concreteness, while related, are unique constructs.

Imageability may likewise be linked to, but is not synonymous with frequency. For example, Ma, Golinkoff, Hirsh-Pasek, McDonough, and Tardif (2009) found that adult imageability ratings of children's early words (as presented on the MacArthur-Bates Communicative Development Inventory or CDI, Fenson et al., 1994) were only correlated with input frequency (using CHILDES corpora, MacWhinney, 2000) in Chinese but not in English. That study also showed that imageability and input frequency *independently* predicted the age of acquisition of CDI words. On an anecdotal level, articles such as "the" likely represent some of the most frequent words that children hear, but they are not highly imageable.

Recent experimental studies with adults provide converging evidence that imageability may play a role in word acquisition (Bird, Franklin, & Howard, 2001; Gillette, Gleitman, Gleitman, & Lederer, 1999; Snedeker, Brent, & Gleitman, 2001; Snedeker & Gleitman, 2004). Gillette and colleagues (1999), for example, asked adults to guess words (24 nouns and 24 verbs) spoken in silent videos of a mother and a child interacting, simulating the word learning process children experience. They found that adults were far more successful at guessing the nouns than the verbs. When another group of adults rated how imageable these nouns and verbs were, nouns were rated significantly more imageable than the verbs. Furthermore, when entered in a multiple regression analysis, a word's imageability was a significant predictor of the word's identifiability while lexical form class (noun or verb) had no significant effect. This pattern concords with that found with normal as well as aphasic adults, in which controlling for imageability eliminates form class effects during lexical recognition tasks (Davelaar & Besner, 1988; Howard & Franklin, 1988).

Imageability has also been shown to be a significant predictor of naming performance in adults (e.g., Ellis & Morrison, 1998) and in children (Masterson, Druks, & Gallienne, 2008). For example, Masterson et al. (2008) gave 3- and 5-year-olds the task of naming a battery of 100 object pictures and 100 action pictures. Results showed that imageability was a significant and robust predictor of action and object naming among the 3-year-olds and of object naming among the 5-year-olds. Word frequency was not a significant predictor of naming at age 5 and only predicted action naming at age 3. In this study, adults' retrospective estimation of words' age of acquisition (same as in Masterson & Druks, 1998, see below) significantly correlated with object and action naming accuracy at both ages. Although the authors did not report the correlation between the two predictors, age of acquisition and imageability, it was likely that they were related. In fact, in another adult naming study in which age of acquisition (normed from children's performance on picture naming tasks) and imageability were involved as predictors, the correlation between these two was as high as −.58 (Ellis & Morrison, 1998).

Masterson and Druks (1998) examined the relationship *between* imageability and age of acquisition by asking adults to provide imageability ratings for several hundred nouns and verbs. Another group of adults was asked to provide retrospective age of acquisition ratings on the words on a 7-point scale with each point representing a 2-year age band. For example, "1" meant that the word was acquired from 0–2 years of age, while "7" meant that the word was acquired after age 12. Results showed that nouns were rated as significantly more imageable than verbs, and imageability was significantly negatively correlated with reported age of acquisition for both nouns and verbs, i.e., more imageable words were acquired earlier. Taken in the aggregate, these studies suggest that if highly imageable words, regardless of word class, are more easily identified than less imageable words, perhaps highly imageable words are also easier to learn.

There are three limitations, however, with previous attempts to link imageability and acquisition. First, data on age of acquisition were generally obtained by asking adults to

remember when they first started to produce a word (Bird et al., 2001; Druks & Masterson, 2000; Gilhooly & Logie, 1980; Masterson & Druks, 1998). However, the phenomenon of "infantile amnesia" (e.g., Newcombe & Fox, 1994), along with a lack of control for memory ability, make the results questionable (although see Morrison, Chappell, & Ellis, 1997). Parental report of children's vocabulary may be a more reliable measure of age of acquisition. Second, the scale provided to adults to estimate age of acquisition typically spans a long period of time (from childhood to adulthood) with each level of the scale representing a period of several years. This practice makes it virtually impossible to assess a precise age of acquisition of the words learned during the first two years of life. Third, much of the imageability literature has focused on nouns. Except for Masterson and Druks (1998), Masterson, Druks, and Gallienne (2008), and Gillette et al. (1999), few studies have examined verbs' imageability or compared imageability ratings between verbs and nouns (e.g., Bird et al., 2001), making it impossible to address the noun-verb disparity in early acquisition.

In response to these limitations, the current study addresses two questions. First, is there a relationship between imageability and children's age of acquisition of words as assessed by parental report? If a significant correlation exists between imageability and age of acquisition, there may be two reasons for the relationship. It could be that imageability is simply another way of indexing the noun-verb distinction, predicting age of acquisition no better than a word's form class. Alternatively, imageability may account for a word's age of acquisition *above and beyond* that word's form class. Whether imageability accounts for a word's age of acquisition *above and beyond* form class is the second question addressed by this study. We employed existing data to examine these questions.

Method

Measure of Imageability

Published imageability ratings were obtained from Masterson and Druks (1998), as per Paivio et al. (1968), using a scale of 1–7, with "1" representing "words arousing images with the greatest difficulty" and "7" representing "words arousing images most readily." This measure of imageability was selected because Masterson and Druks (1998) exerted careful control over their method and their selection of words. For example, instructions to participants were clear as to whether they would be rating the imageability of nouns or verbs (e.g., placing "to" in front of the verb, particularly important for the treatment of noun-verb homonyms such as *comb*) and words were matched on other dimensions such as frequency and familiarity. Their word sample included 164 nouns and 102 verbs.

Measure of a Word's Age of Acquisition

There are three common approaches to measuring children's vocabulary: 1) speech corpora, 2) standardized testing (such as the PPVT-R, Dunn & Dunn, 1981), and 3) parental report (see Bornstein & Haynes, 1998, for a summary). Arguably, the best measure of a word's age of acquisition comes from children's actual speech. However, existing corpora do not contain speech sampled 1) from a large number of children, 2) at close intervals, and 3) in a variety of contexts. Further, corpora with high sampling rates often involve very few children, making it difficult to generalize a word's age of acquisition across the population. Standardized tests are also problematic, as children may not display their full vocabulary knowledge when queried by a stranger in a highly controlled situation (Bornstein & Haynes, 1998), especially at a young age. Moreover, standardized tests do not capture the very earliest words that children learn. The PPVT, for example, can only be used starting at 29 months and is biased towards nouns as it is difficult to represent dynamic actions in pictures.

Parental reports, however, have been argued to provide more valid, reliable, and comprehensive information (Thomas, Chess, Birch, Hertzig, & Korn, 1963). Thus, as our focus was on the relationship between imageability and the age of acquisition of early acquired words, we derived the age of acquisition data from the published MacArthur-Bates Communicative Development Inventory: Words and Sentences (CDI; Fenson et al., 1994), a widely used instrument that asks parents to report when their children *produced* a word by checking it off from a list. Age of acquisition was defined as the age (between 14 and 30 months) at which at least 50% of children have a noun or verb in their *productive* vocabulary, normed across a large sample of 1130 children. The correlations between the CDI age of acquisition and children's performance on vocabulary tests in the laboratory are generally substantial, ranging from .33 to .85 (median = .61) (Fenson et al., 1994). A study by Feldman and colleagues (2005) which correlated scores on the CDI at ages 2 and 3 with scores on cognitive and receptive language tests as well as measures from parent-child conversation at age 3 found reasonable concurrent and predictive validity for CDI scores.

Of the 363 nouns and 129 verbs with published age of acquisition data on the CDI, 76 nouns and 44 verbs had imageability ratings published in Masterson and Druks (1998) and were included in the current study. Although a more balanced sample (i.e., similar numbers of nouns and verbs) might be desirable, we did not trim the sample for the following reasons. First, according to Rummel (1970), the ratio of the cases in each category of a dichotomous variable should be lower than 9:1. The ratio in the current study is 1.73:1. Second, Green (1991) suggested that the required sample size for testing individual predictors be no less than 104 + m (m is the number of predictors which is 2 in the current study). Thus, the minimum number of words should be 106. Trimming the sample would cause loss of statistical power. Third, the split of the values in the sample is consistent with the split observed in the population – a higher proportion of nouns than verbs in young children's vocabularies.

Data Analysis

The dependent variable was the CDI age of acquisition (Fenson et al., 1994). The two predictors were 1) form class (noun = 0, verb = 1) and 2) imageability ratings (Masterson & Druks, 1998). First, simple correlations were conducted between the age of acquisition and imageability within and across form classes. Second, the dependent variable and the two predictors were entered in a hierarchical multiple regression to examine the two predictors respectively. The regression analysis allowed us to examine the noun-verb disparity beyond simple grammatical class distinctions.

Results

Is There a Relationship between Parent Reported Age of Acquisition and Imageability?

The distributional statistics are shown in Table 1. On average, the noun class has a significantly younger age of acquisition and a significantly higher imageability rating than the verb class (p's < .001). We next examined the relationship between age of acquisition and imageability rating *across* all the words and *within* each form class. For all words (nouns and verbs combined), CDI age of acquisition was significantly correlated with imageability ($r(118) = -.45$, $p < .001$). Further, CDI age of acquisition was significantly correlated with imageability for nouns alone ($r(74) = -.39$, $p < .001$), and for verbs alone ($r(42) = -.35$, $p = .02$).

Does Imageability Predict Words' Age of Acquisition Above and Beyond Form Class?

We employed a two-step hierarchical multiple regression analysis using words' age of acquisition on the CDI as the dependent variable. A word's form class and imageability

rating were two independent variables. At step 1, we entered words' form class (noun vs. verb). After controlling for form class, we entered words' imageability rating at step 2 to test whether imageability had any additive effect on the dependent variable. The residuals after running the regression showed normal distribution, suggesting that normality can be assumed and it was appropriate to proceed without transforming the variables (Tabachnick & Fidell, 2007).

Table 2 shows the results of the regression analysis. The two independent variables, words' form class and imageability rating, both significantly correlated with CDI age of acquisition and they significantly correlated with each other (*r*'s are shown in Table 2, second and third columns). R^2 change was significantly different from zero at the end of each step. When entered at step 1, form class uniquely accounted for 11% of the variance of the dependent variable ($F(1, 118) = 15.03$, $p < .001$). After step 2, imageability rating accounted for an additional, and significant, 11% of the variance ($F(1, 117) = 15.69$, $p < .001$). As indicated by the R^2, form class and imageability rating together accounted for 22% of the variance of CDI words' age of acquisition. The unstandardized coefficient (B) indicates that when holding imageability rating constant, nouns are acquired earlier than verbs by 1.63 months. Likewise, when holding form class constant, an increase of 1 point on the 7-point imageability rating scale is associated with a decrease of 2.31 months in the age of acquisition. The standardized coefficients (also known as beta weights, shown in the β column in Table 2) allow us to compare the relative predictive power of the two independent variables directly. The ratio of the beta weights ((−.66)/(−.24) = 2.75) indicates that the imageability rating is more powerful at predicting the age of acquisition than form class in the current regression model.

Thus, the imageability rating not only predicts CDI age of acquisition above and beyond a word's form class, but its predictive power also exceeds that of the word's form class using the current data set.

What is the Role of Frequency?

Although the primary focus of this research was the relationship between imageability and age of acquisition, recent work by Ma et al., (2009), showing a relationship between frequency and imageability in Chinese, prompted the question of whether frequency might also play a role in English. To explore this question, we conducted an analysis in which frequency was entered as an additional predictor in the original hierarchical multiple regression. Input frequencies of all 120 words in our dataset were obtained from the CHILDES database of words directed to children in naturalistic settings (Li & Shirai, 2000; MacWhinney, 2000).

CDI Age of Acquisition was the dependent variable. Form class (noun vs. verb) was entered at step 1. Frequency was entered at step 2. After controlling for both form class and frequency, imageability was entered at step 3, making it a highly stringent test of the effect of imageability. Table 3 shows the results of the regression analysis. Frequency did not correlate with either form class or imageability. At step 1, form class accounted for 11% of the variance in age of acquisition ($F(1,118) = 15.03$, $p<.001$). At step 2, frequency accounted for an additional 9% of the variance ($F(1,117) = 13.71$, $p<.001$). Finally, imageability accounted for an additional, significant 10% of the variance at step 3 ($F(1,116) = 16.39$, $p<.001$). As indicated by the R^2, form class, frequency, and imageability together accounted for 30% of the variance in CDI age of acquisition. The ratio of the beta weights revealed that the imageability rating was more powerful at predicting the age of acquisition than either form class or frequency (−.64/−.18 = 3.56 for imageability compared to form class; −.64/−.30 = 2.13 for imageability compared to frequency). This analysis confirmed the importance of imageability in predicting a words' age of acquisition above and beyond

form class in the current data set, and showed that frequency also accounts for additional variance in age of acquisition.

Discussion

Descriptions of the relative preponderance of nouns over verbs in young children's early vocabularies do not fully explain *why* there might be a disparity between these form classes. Rather than focus on the differences between form classes, this study examined a conceptual factor blind to form class, namely, imageability. The CDI age of acquisition data indicate that nouns, on average, are acquired earlier than verbs. The imageability ratings for these words suggest that nouns are more imageable than verbs (see also Ma et al., 2009). We asked two main questions based on these data. First, is there a relationship between words' age of acquisition and imageability ratings in English? Second, do imageability ratings predict a words' age of acquisition above and beyond form class (i.e., whether it is a noun or a verb)? Affirmative answers were found for both questions.

Our results reveal a significant relationship between imageability and parent reported age of acquisition. That is, words with higher imageability ratings (more imageable) tend to be acquired earlier than words with lower imageability ratings. This finding was present for nouns alone, verbs alone, and for nouns and verbs combined. Any significant correlations between CDI words' age of acquisition and imageability ratings are noteworthy, since the CDI involves such a restricted age range (14 to 30 months).

Having established the correlation between imageability and age of acquisition, we examined whether imageability contributes to the prediction of age of acquisition *beyond* form class. A hierarchical multiple regression model revealed that, although imageability rating correlates significantly with form class, it accounts for an additional, unique, 11% of the variance of the age of acquisition. Further, imageability rating showed a larger predictive importance than form class, as well as a larger predictive importance than frequency in the current regression models. Finally, the effect of the interaction between form class and imageability rating was not significant. These results suggested that imageability may be a potentially important predictor of age of acquisition.

Our estimate of words' age of acquisition was based on parental reports. One might expect that retrieval of known words by parents might also be affected by a word's imageability. Age of acquisition obtained from children's speech data might avoid this potential confound. However, as mentioned earlier, corpus data are constrained by their own sampling biases and represent only a small number of children, thus lacking validity in these respects. On the other hand, albeit indirect, parental reports have reasonably high validity. Previous research has established that the CDI parental reports of words' age of acquisition have good concurrent and predictive validity (e.g., Feldman et al., 2005; Fenson et al., 1994). Dale (1991) argued that limitations of the vocabulary tests themselves may result in an underestimation of the true validity of the CDI measure. Thus, the CDI age of acquisition based on parental reports offers a reasonably good gauge of the true age of acquisition.

The relationship between words' age of acquisition and imageability ratings exists in other language communities as well. Cross-linguistic work in Italian (Bates, Burani, D'Amico, & Barca, 2001) and Portuguese (Marques, Fonseca, Morais, & Pinto, 2007) suggests that, at least with nouns, words higher in imageability appear earlier in children's vocabularies. Morrison et al. (1997) report similar findings for nouns in British English. Ma et al. (2009) find that, as in English, ratings of imageability of Chinese children's early vocabularies correlated negatively and significantly with age of acquisition. Further, they suggest that imageability ratings may help explain discrepancies between the earliest Mandarin and

English vocabularies. They showed that, in contrast to the findings in English presented here, early nouns and verbs in Mandarin were much closer in imageability when rated by native Chinese speakers. In the earliest vocabulary, Chinese verbs were also rated as more imageable than were English verbs.

These findings suggest that the early dominance of nouns may not simply be a function of form class. Rather, it may have a conceptual explanation – highly imageable words may be easier to learn. This leads us to two crucial questions: What is imageability? And why does imageability predict age of acquisition?

Paivio et al. (1968) defined a mental image as "a mental picture, or sound, or other sensory experience" (p. 4), suggesting that imageability is not tied to vision. Interestingly, studies have found the same imagery effect among blind people. For example, Craig (1973) found that when asked to recall lists of aurally presented words, both the blind participants (70% congenitally blind) and the normal controls performed better with high-imageability words than with low-imageability words (based on normed ratings from sighted people and controlled for frequency). Furthermore, the use of a mnemonic that required generating images of words, improved the memory of congenitally blind and sighted participants to the same degree (Jonides, Kahn, & Rozin, 1975). Thus, imageability does not seem to be confined to a specific modality. However, it remains an empirical question whether blind adults' imageability ratings of words predict the age of acquisition of blind children's early vocabulary.

Why are high-imageability words learned earlier than low-imageability words? We suggest that words with high imageability label objects and actions that are easily perceived (in any modality) as separate and distinct. Imageability may also relate to the saliency and consistency of contexts in which the word/referent pairing occurs. The Emergentist Coalition Model (Golinkoff & Hirsh-Pasek, 2006; Hollich et al., 2000) posits that the first words learned are those that label perceptually salient and accessible concepts that are encountered in a restricted range of contexts. Perhaps the accessibility and perceptual salience of a word's referent is what makes high imageability ratings possible, in accordance with a principle like "encoding specificity" (Tulving & Thomson, 1973). Words that name salient concepts (either objects or actions), and are often heard in consistent contexts, may likely be easier to represent or imagine, and might thus appear earlier. These will often be nouns; however, some verbs (like *eat*) appear in consistent contexts as well.

Some verbs with broad meaning are learned early in English, apparently contradicting the imageability hypothesis formed here. Research suggests, however, that these broad verbs are often used with limited and very specific meanings, thereby not reflecting the breadth of meanings adults use. For example, Theakston, Lieven, Pine, and Rowland (2002) found that the word "go" was used by children to mean different things in its different forms. Children reliably used *go* to mean movement, as in "I am going in the car"; *goes* to mean belonging, as in "This book goes on the shelf"; and *gone* to mean disappear, as in "Where's that book gone?" Thus, children did not possess a single lexical entry for "go" but rather a number of separate or partially related and not linked entries representing each meaning.

Form class and imageability ratings together account for 22% of the variance of the age of acquisition of children's words, indicating that other factors may also play a role in explaining why some words are learned earlier than others. Indeed, our second regression analysis demonstrated that frequency accounted for additional, unique variance in age of acquisition. When added to the regression model, form class, frequency, and imageability together accounted for 30% of the variance in age of acquisition. Importantly, imageability

contributed unique variance, after accounting for form class and frequency and was a more powerful predictor of age of acquisition that both of these variables.

Even though this research merely scratches the surface, it expands our understanding of word learning mechanisms by asking whether imageability, a factor related to meaning, plays a role in children's real-time word learning. It also offers a new look at one of the factors behind the noun-verb disparities reported in the literature. Imageability may provide us with a measure of a concept's concreteness, perceptibility, and individuability. Nouns may be easier to learn than verbs because they are generally though not always more concrete, and easier to perceive and individuate than verbs. Early learned verbs (such as *kiss* and *hug*) are more imageable and perhaps used in more consistent contexts than later learned verbs (such as *hate* and *pretend*) (Fenson et al., 1994). Thus, across – and even within form classes, the earliest learned words are those that are more imageable.

Conclusions

The results of this study suggest that factors beyond form class per se and beyond word frequency play a role in early word acquisition. In particular, factors that relate to word meaning such as imageability appear to be predictive of when words are acquired. Words that are highly imageable are acquired earlier, regardless of whether they are nouns or verbs. The fact that, in English, early nouns are higher in imageability than early verbs raises the possibility that early acquisition may depend on children's extraction of the core meaning of a concept, as reflected in its imageability rating.

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Table 1

Distributional Statistics for CDI Words' (N = 120) Age of Acquisition, Form Class and Imageability Rating

	Overall	***Nouns* (*N* = 76)**	***Verbs* (*N* = 44)**
CDI Age of Acquisition (in months)	22.18 (3.32)	21.33 (3.54)	23.64 (2.28)
range		14 – 30	19 – 29
Form Class	0.37 (0.48)	0	1
Imageability Rating	5.46 (0.95)	6.08 (0.38)	4.37 (0.60)
range		4.78 – 6.64	3.00 – 5.47

Notes:

Standard deviations are presented in parentheses.

Form class was coded with nouns being 0 and verbs being 1.

Table 2

Hierarchical Multiple Regression of CDI Words' Form Class and Imageability Rating on Age of Acquisition

Variable	CDI Age of Acquisition (DV)	Form Class (noun vs. verb)	*B*	*SE B*	β	sr^2 (ΔR^2)
Form Class (noun vs. verb)	.34***		−1.63	1.14	−.24	.11***
Imageability Rating	−.45***	−.87***	−2.31	.58	−.66	.11***
Constant			35.36	3.56		

R^2 = .22; Adjusted R^2 = .20

*** $p < .001$

Table 3

Hierarchical Multiple Regression of CDI Words' Form Class, Frequency, and Imageability Rating on Age of Acquisition

Variable	CDI Age of Acquisition (DV)	Form Class (noun vs. verb)	CHILDES Frequency	*B*	*SE B*	*b*	sr^2 (ΔR^2)
Form Class (noun vs. verb)	.34***			−1.21	1.09	−.18	.11***
CHILDES Frequency	−.25**	.14		−.001	.00	−.30	.09***
Imageability Rating	−.45***	−.87***	−.11	−2.23	.55	−.64	.10***
Constant				35.70	3.37		

R^2 = .30; Adjusted R^2 = .29

** p <.01

*** p < .001