

A Qualitative Longitudinal Analysis of Vanishing Words in Children's  
Parent-Reported Vocabularies

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### Abstract

The present research is a qualitative analysis of children's vocabularies based on parent report. The focus is on vanishing words, or words that reportedly come and go from the vocabularies of children. The two general reasons for changing vocabularies are parent error or words actually leaving and returning to children's vocabularies. The vanished words of two groups of children were examined to see if there were patterns behind the vanished words in an attempt to see if the source of this vanishing was random parent error, or something systematic either on the part of the child or the parent. Such a phenomena has not been examined before, and no definitive claims can be made from the present research regarding if words truly disappear and then return to the lexicon of children. However, the present study observes that children who exhibit a language delay in relation to their peers tend to have more instances of words coming and going from their vocabularies. Despite limitations, the present work opens up room for questions and speculation regarding parentally reported vocabularies.

## A Qualitative Longitudinal Analysis of Vanishing Words in Children's Parent-Reported Vocabularies

The present investigation looks to deeply examine the growth and loss of words in parentally reported vocabularies. More specifically, the consistency in reported vocabularies as measured longitudinally, in multiple sessions, with a vocabulary checklist completed by parents of toddlers is examined. During this time frame, children's vocabularies grow at a rate that fascinates many researchers. However, there has been no work done looking at the consistency in parentally reported vocabularies in this manner. In this thesis I take a first look at this question in two groups of toddlers, with and without hearing loss. The introduction offers an overview of the parent report inventory and of parent report itself.

### *MacArthur-Bates Communicative Development Inventory*

It has been suggested that the MacArthur-Bates Communicative Development Inventory (MCDI) is a parent report inventory that can assess early language skills (Heilman et al., 2005). There are a variety of different versions formulated for different ages of children. When the MCDI is mentioned in this paper in terms of the present study it is referring the Vocabulary Production section of Words and Sentences version; normed for children 16-30 months of age, assessing for words that children can say.

The section consists of 680 words that the parent can mark as words that their child produces. Organized in 22 semantic categories, the parent is instructed to check off words that their child says. It is noted that children know a lot more words than they

actually say, and there is emphasis placed on only marking words that their children say, not just know.

### *Validity of the MCDI*

Many studies have found the MCDI to be a valid measurement of vocabulary for typically developing children, children who are delayed in early language development, and also children who are hard of hearing (Thal et al., 2007). Several methods have been implored to validate the MCDI, like comparing it to direct assessments of language functioning such as recorded expressive language (Heilmain et al., 2005, p.41).<sup>1</sup> The several validity studies of the MCDI have led researchers to see the MCDI as a way to assess vocabulary size.

The Vocabulary Production section of the MCDI also has high face validity, in that it appears to the person filling out the form that it is a way to measure child's vocabulary production. In the user guide, Fenson et al. (2007) says "face validity is highly desirable for parent report measure, as it facilitates a concerted effort by the parent to complete a CDI form fully and accurately. The professional appearance of the CDI forms encourages the parent to take them seriously . . . increasing the probability that parents will regard the form as presenting an opportunity to portray their children's communicative skills accurately and completely" (p. 102). This argument, that the appearance of the MCDI encourages parents to complete it to the best of their ability could mediate the issue mentioned by Dale (1991) that the accuracy of parent report could be diminished by the fact that they are not trained in vocabulary/vocabulary development (p. 555-556). Face validity of the MCDI is important for this study because

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<sup>1</sup> For an extensive overview of validity studies for the MCDI see Thal et al., 2007.

it seems that say that the MCDI encourages parents to pay close attention to the form and fill it out as accurately as possible. If it is assumed that parents are filling out the MCDI accurately, it may be more likely that words are actually coming and going from the vocabularies of children, as opposed to parent error.

#### *Test-retest Reliability of the MCDI*

The test-retest reliability of the MCDI was tested with 216 pairs of MCDIs. Families were sent a second MCDI form shortly after they had returned their first MCDI form in. There was an average test re-test lag of 1.38 months (range 0.73-2.94 months) and the test re-test correlation for the vocabulary production section to found to be .95( $p < .01$ ) (Fenson et al., 2007, p. 101). It is important to note that this test of reliability has only been tested on a pair of tests around one month a part, not on a group of tests over a longer period of time. Furthermore, individual words were not examined, but instead the total number of words; therefore not lending any information about specific words or categories of words.

#### *Parent Report*

The MCDI relies on parent report as the source of information regarding the language abilities of the child being assessed. There are many benefits to parent report. In a lab setting, it is at times difficult to have a child willing to interact with the researcher and they do not always cooperate with testing, and because parent report does not require any child cooperation, it is beneficial (Feldman et al., 2000). Parents also spend a lot of time with their children in many different environments; therefore it is more likely that parents have a more comprehensive appraisal of their child's language

skills than could be obtained from a clinical sample (Feldman et al., 2000, p. 310). Information regarding children's vocabulary obtained in a lab can in no way be as complete as the information obtained from someone who spends multiple hours a day every day with their child. Even with parents who work and do not interact with their child every day for long periods of time still may have a better idea of what their children say than a researcher who spends an hour with the child administering various tests.

There are also limitations to parent report. Despite spending a lot of time with their children, Dale (1991) notes that the majority of parents are not trained in language development and may not be as aware of the subtleties of their child's language use (p. 555-556). Dale (1991) also notes that parents may have a lot of pride in their children and overestimate their ability because they do not think critically about their observations (p. 566). A parent may overestimate the expanse of a child's lexicon at one point, and could also underestimate it at another. The user guide for the MCDI acknowledges these limitations and confesses to "unease about the uncritical application of the CDI in some quarters especially when it has served to replace rather than supplement direct observation and collection of laboratory data on language skills" (Fenson et al., 2000, 327).

When approached with criticisms regarding the evaluative properties of the MCDI, contributors say that inconsistencies could be a reflection of the instability of language ability in the age range measured by the MCDI (Fenson et al., 2000). This inconsistency, however, is not expanded upon. Parent report on the MCDI has been frequently discussed, but the words that are inconsistently reported on the vocabulary production section of the MCDI are what the present study seeks to investigate.

## **Present study**

### *Discovery of Vanished Words*

To track vocabulary over a period of time, the MCDI can be given to parents to fill out multiple times. When reviewing sets of MCDIs filled out once a month for a year, it was found that there were words that were inconsistently marked after they were initially marked as being in the child's vocabulary. For example, the parent might have checked off alligator in the animal section for months 1 through 3, did not check it for months 3 through 6, checked it again for month 7, and so on.

We found that this inconsistency of parent reported vocabulary occurred in many sets of MCDIs from a yearlong study done in the Language Project Lab at the University of Colorado at Boulder.<sup>2</sup> In an effort to look for patterns in the phenomena to be referred to as “Vanishing Words” a set of MCDI data from the Language Project Lab was examined. To extend the observation of MCDI data from a study done on deaf/hard of hearing children in the Speech Language Hearing Sciences department at CU Boulder was examined as well, in order to see if vanished words occurred in other populations.

Realizing that the instance of vanishing words occurred in almost every data set of both populations was intriguing. If patterns existed behind words that appeared and reappeared in parent reported vocabularies or if the words “lost” were random and only a product of parent error became the basis for the questions explored. No previous research has been done regarding the specifics of vanishing words on the MCDI, opening up the research question to many possibilities. The present study looks to see if there are patterns behind the words that come and go.

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<sup>2</sup>I have worked as a research assistant in the Language Project Lab since January 2012

There are many possible reasons for why words come and go. The first being parental inconsistency; resulting from time constraints, lack of attention to the form, or inconsistent attention to the child's vocabulary. Words could also come and go because children may not retain all of the words that they learn. This could result from the environment not requiring use of the word; for example zoo may only be used in the summer time. Infrequent use of some words may also lead to why words would come, either by making the child's knowledge of the word less robust or by making the parents' memory of their child using the word less robust.

### *Types of Talkers*

One of the uses of the MCDI is that it can assign a child to a category of language ability based on the percentile factored from age and number of words marked on the vocabulary production section of the MCDI. Children who are in the 80<sup>th</sup> percentile or above are classified as early talkers, those in the 25<sup>th</sup> percentile and below are classified as late talkers.

Late talkers are children who exhibit a language delay in relation to their peers. Although not a homogenous group, these late talkers share the common characteristic of small vocabularies and show a language delay without other underlying cognitive pathology (Desmarais et al., 2008, p. 362). It is understood that late talkers do not add more words to their working vocabularies as fast as their typically developing peers (MacRoy-Higgins, 2009, p. 3). If late talkers add words to their working vocabularies slower than their peers, it could be inferred that they would also lose words, or struggle to retain new words, more than their peers as well. For the present study it was



hypothesized that the early talkers would have fewer vanished words overall than late talkers if words were actually vanishing from the children's vocabularies.

### *Semantic Categories*

After looking at who lost words, the types of words lost were investigated. The 22 different categories in the vocabulary production section are: sound effects and animal sounds, animals, vehicles, toys, food and drink, clothing, body parts, small household items, furniture and rooms, outside things, places to go, people, games and routines, action words, descriptive words, words about time, pronouns, question words, prepositions and locations, quantifiers and articles, helping verbs, and connecting words. It was hypothesized that there could be categories of words that were more prone to vanishing than others.

### *Age of Acquisition*

The words in the fore mentioned categories are acquired at different ages. Dale and Fenson (1996) found the lexical norms, or the average ages of acquisition, for each word on the MCDI based on age from a large sample of MCDIs. The age of acquisition is determined when 50% or more of the sample is reported to say the word. For example, it is reported that the age of acquisition for penguin is 29 months because that is the age that 53.3% of the group have acquired the word. It was hypothesized that the semantic categories that had the highest instances of vanished words would include words with later acquisition ages and that semantic categories with the least vanished words would include words with earlier ages of acquisition.

The present study asks three questions. First it asks if late talkers exhibit the phenomenon of vanished words more than their middle and early talker peers. Second, it asks if different types of words are more prone to vanishing than others. Lastly, it asks if there is a relationship between categories with more vanished words and the age at which the words were acquired.

## **Methods**

### *Participants*

#### Typical-hearing group

The first set of data was taken from a longitudinal research study done by the Language Project research lab at the University of Colorado. Participants for the study were recruited from the Denver/Boulder area. There were 34 participants, and they were 16-17 months old at the beginning of the study, and 28-29 months old at the end of the 12-month period of March-April 2010 – March-April 2011. Participants came in once a month for a year, and at each monthly session the parents filled out a MCDI Vocabulary production form (see Appendix A), marking the words their child says.

#### Hearing-loss group

The second set of data is from taken from research on deaf/hard of hearing children by Dr. Christine Yoshinaga-Itano's lab in the Speech Language Hearing Sciences department at CU Boulder. The deaf/hard of hearing participants in Yoshinaga-Itano's lab were also recruited from Colorado for a large-scale study that evaluated participants in several domains. The data used for the present study were sets of 3 MCDIs filled out over 3 visits about 6 months apart. MCDI data of 23 participants were recorded and met the inclusion criteria of having 3 Words and Sentences MCDI forms

filled out new each visit and also that they did not exhibit any other developmental disabilities that would impact language as indicated on a demographic form. Because the age range is more variable for the hearing loss group than the typical-hearing group, the participant's ages at each visit are shown in Table 1 below.

Participant	Age 1	Age 2	Age 3	Participant	Age 1	Age 2	Age 3
4_MCDI_917	21	27	33	18_MCDI_784	22	29	33
5_MCDI_1017	21	27	34	19_MCDI_1205	21	27	32
6_MCDI_615	23	28	36	21_MCDI_721	21	27	33
7_MCDI_768	20	28	35	22_MCDI_803	22	26	32
8_MCDI_1141	21	26	34	23_MCDI_713	21	27	33
10_MCDI_1130	23	29	34	24_MCDI_1216	27	32	35
11_MCDI_1081	21	26	33	26_MCDI_819	21	27	33
12_MCDI_948	21	27	32	27_MCDI_984	21	27	32
13_MCDI_1078	22	28	33	28_MCDI_632	20	27	35
14_MCDI_1046	23	27	33	29_MCDI_1106	21	27	33
15_MCDI_788	21	27	33	30_MCDI_801	21	26	32
16_MCDI_644	22	25	36	Average age for each visit	<b>21.58</b>	<b>27.03</b>	<b>33.83</b>

*Table 1: Ages of hearing-loss group at each visit*

### *Materials*

The materials used were the MCDIs filled out by the parents of each participant. There were two different versions of the MCDI used, that which is typically used and published (Appendix A), and a similar but altered version given to the parents of the deaf/hard of hearing participants to indicate whether words are signed, said, or both to better encapsulate the vocabulary of the deaf/hard of hearing child. Lastly, a demographic form filled out by parents of the deaf/hard of hearing participants to determine whether or not they had other developmental disabilities was referenced when selecting the hearing-loss group.

### *Procedures*

The instructions on the original version of the MCDI are: Children understand many more words than they say. We are particularly interested in the words that your child SAYS. Please go through the list and mark the words you have heard your child use. Parents are given the form and instructed to fill it out to the best of their ability.

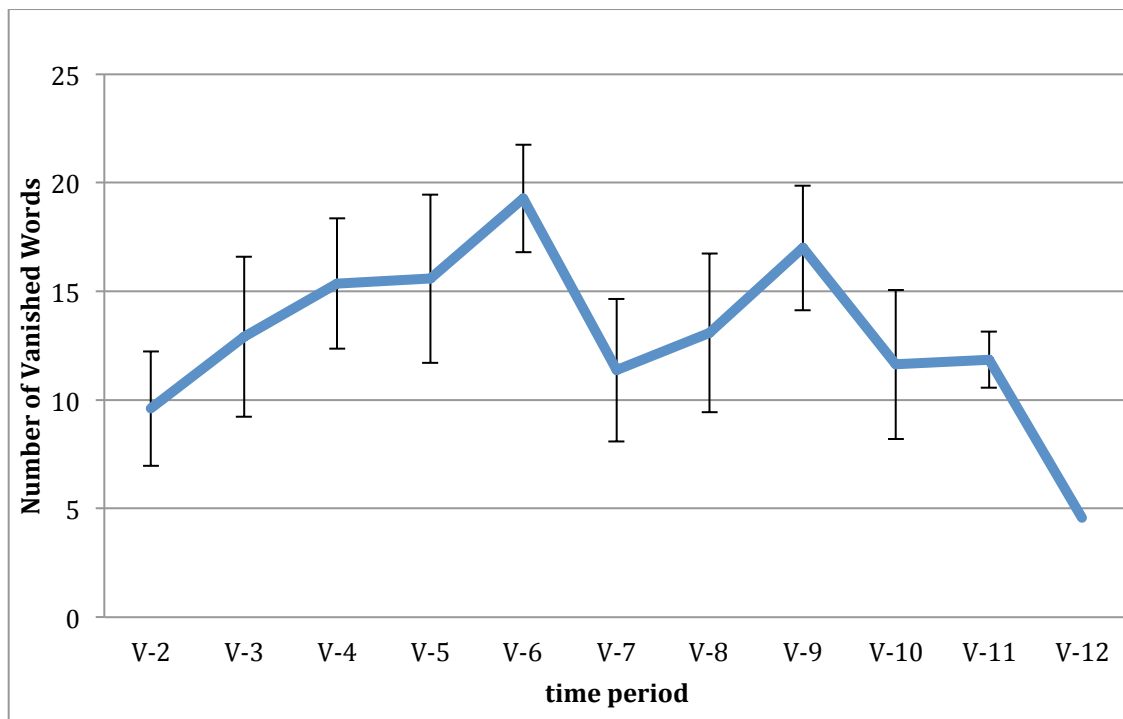
The MCDIs from the 12-month data set were filled out electronically, and the MCDIs from the 3-month set were filled out by hand. In order to consolidate the 3-month MCDI data, the MCDIs were entered into an Excel spreadsheet similar to the paper form. A total of 69 MCDIs were entered from the second group of participants. From there, data analysis was performed for each question asked.

## **Results**

### *Vanished at all*

#### Typical-hearing group

The average number of vanishing words per visit for the typical-hearing group across all 12 visits was 12.9 words. The average number of words vanished from one month to the next is represented in figure 1. The range of the average number of words vanished was 14.69 (19.3-4.58). The participant with the highest average of vanished words had an average of 20% of their words lost over the 12 visits, and the participant with the lowest average of vanished words had an average of .05% of their words lost over the 12 visits.



*Figure 1: Average number of vanished words across all months for typical-hearing group*

#### Hearing-loss group

The average number of vanished words for the hearing-loss group from Visit 1 to Visit 2 and Visit 2 to Visit 3 was 11.85 words. The average percentage of words lost from the total vocabulary for Visit 1 to 2 was 5%, and from visit 2 to 3 was 3%.

These results, especially when looking at individual differences, showed that vanishing words were an occurrence among many of the participants MCDI data in both populations. After looking at the event of vanished words overall, it was asked if talker classification was related to vanished words.

#### *Vanished Words in Late and Early Talkers*

Only the typical-hearing group was given a talker classification, as the hearing-loss group consisted of deaf/hard subjects who cannot be categorized in the same manner.

In the typical-hearing group, there were 6 persistent late-talkers out of 34 participants; identified as late talkers for the majority of their 12 visits. 4 out of the 6 had the highest average percentage of vanished words.

There were many more early talkers in the typical-hearing group, composing 15 of the 34 subjects. Of the 15, 8 early talkers had the lowest percentages of vanished words. The average percentage of vanished words was found by taking the average of the percentage of words lost from visit to visit over the course of all 12 visits (see figure 2).

A one-way between subjects ANOVA was conducted to compare the effect of talker-type on the percentage vanished. There was a significant effect of talker-type on vanished words for the three talker types at the  $p < .001$  level [ $F(2,34) = 15.677$ ,  $p < .001$ ]. Post hoc comparisons using the Tukey HSD test indicated that early talkers and late talkers are significantly different (, early and mid talkers are significantly different, but late and mid talkers are not significantly different at  $p < .001$ . Taken together, these results suggest that talker type affects the percentage of vanished words from children's vocabularies, and that early and late talkers significantly exhibit the phenomenon of vanished words differently.

Although these findings cannot necessarily prove that late talkers are more likely to have vanishing words, it does show some evidence of this. Although this data was limited by the fact that there were not evenly distributed groups of early middle (participants in between early and late talkers) and late talkers, late talkers do comprise the highest percentage of vanished words in the sample and early talkers comprise the least.

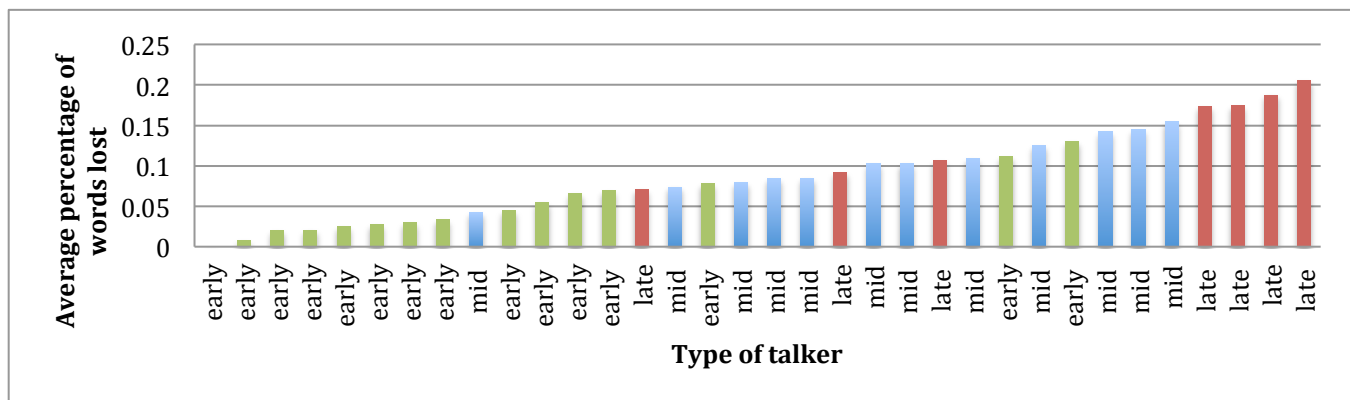


Figure 2: Types of Talkers Average Lost Words

### *Vanished from Semantic Categories*

For both groups, the words that vanished from each semantic category from all the visits were determined. Because simply counting the words lost from each category would not account for the different amounts of words in each category, two proportions were calculated as a way to normalize the counts. The first was the proportion of words vanished from each category and then the proportion of words vanished from each category out of the total amount of vanished words from every participant over the course of all the visits.

### Typical-hearing group

For the typical-hearing group, the proportion of words vanished from each category are represented in figure 3 and the proportion of words vanished from each category out of total words vanished over the year are represented in figure 4.

In looking at the categories themselves, it can be seen that the top three categories of vanished words were pronouns, followed by quantifiers and articles, and then sound effects and animal sounds.

When looked at in terms of how many words vanished from each category in relation to the number of words vanished overall, descriptive words, action words, and food and drink have the highest number of vanished words.

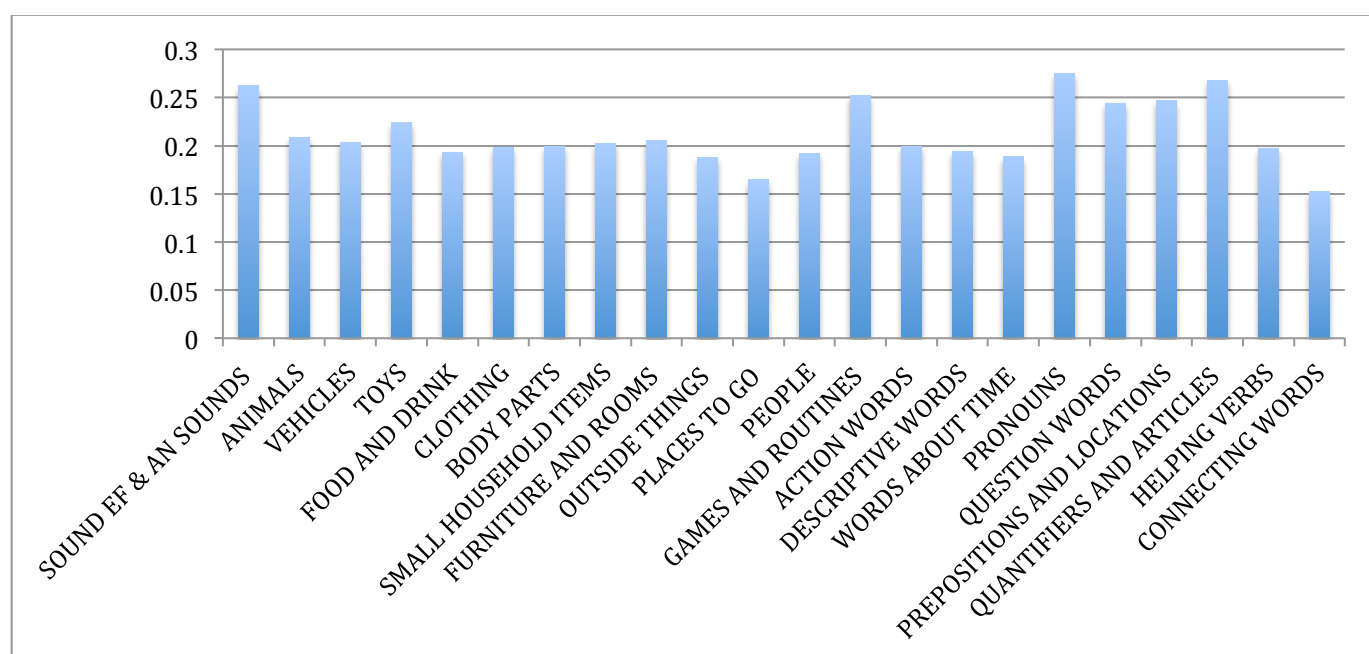
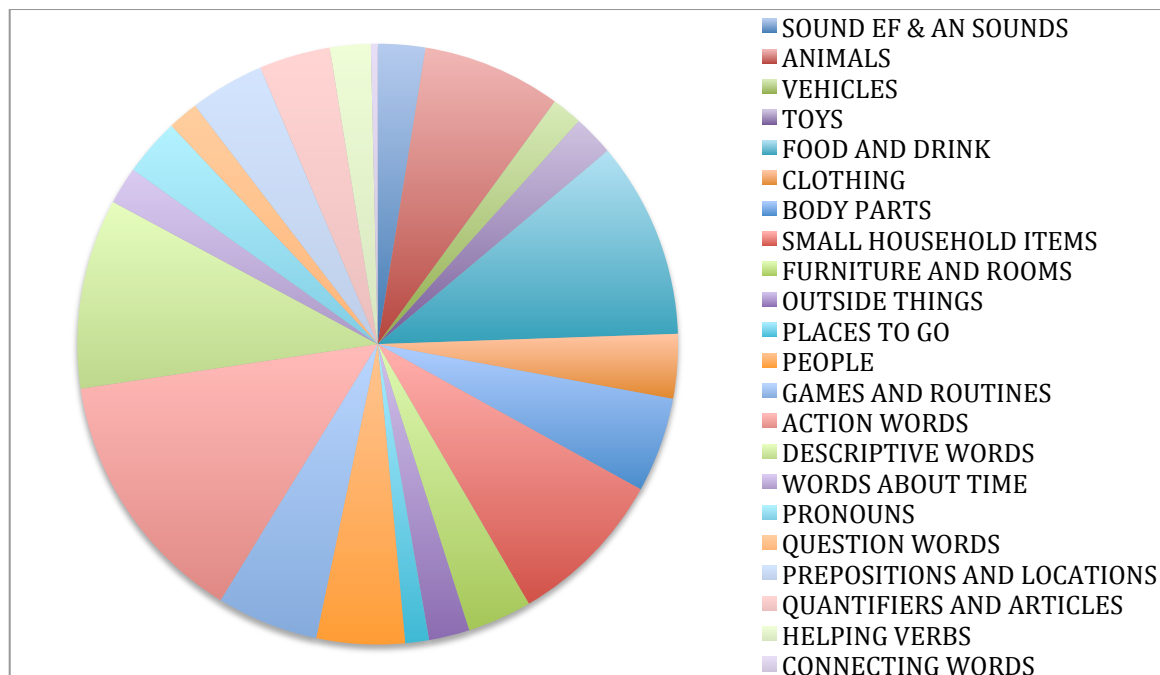


Figure 3: The proportion of words vanished from each category for typical-hearing group





*Figure 4: proportion of words vanished from each category out of total number of words vanished in typical-hearing group*

#### Hearing-loss group

For the hearing-loss group, the proportion of words vanished from each category are represented in figure 5 and the proportion of words vanished from each category out of total words vanished over the 3 visits are represented in figure 6.

In looking at the categories themselves, it can be seen that the top three categories of vanished words were question words, followed by quantifiers and articles, and then games and routines.

When looked at in terms of how many words vanished from each category in relation to the number of words vanished overall, descriptive words, action words, and food and drink have the highest number of vanished words.

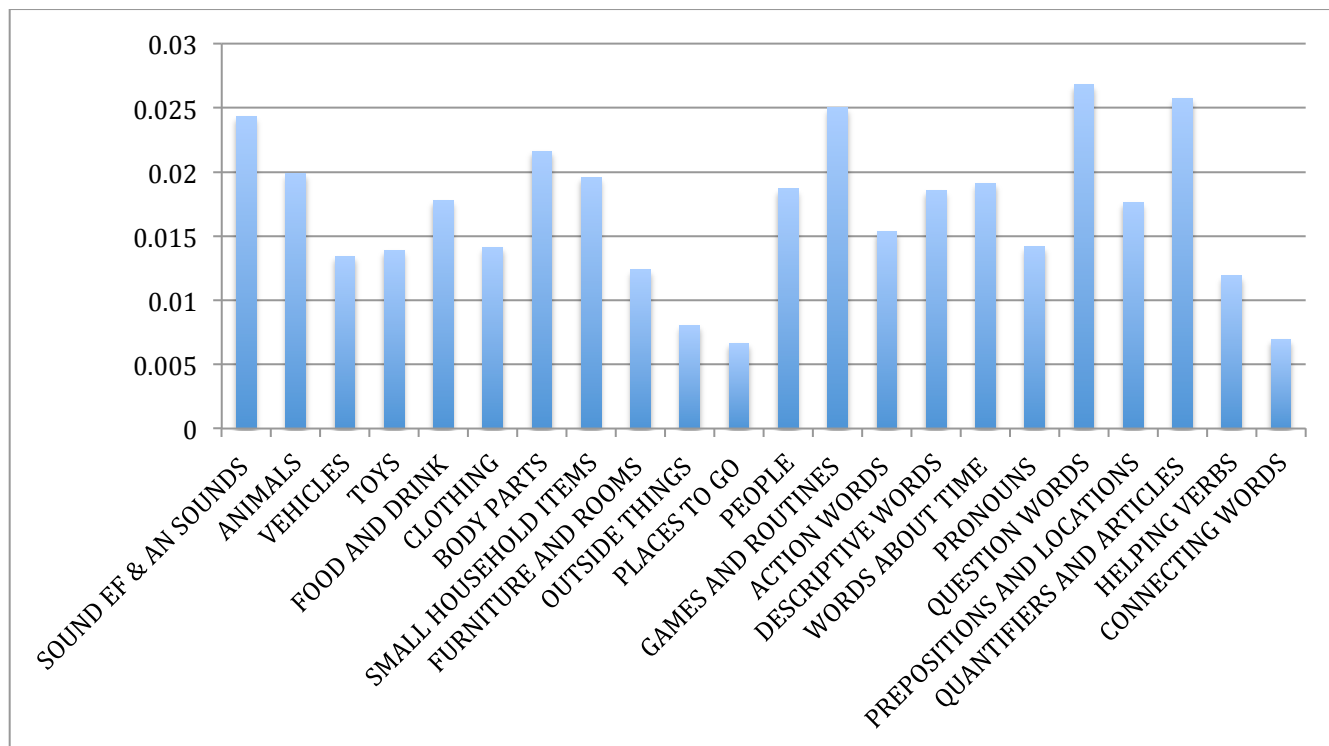


Figure 5: The proportion of words vanished from each category for the hearing-loss group

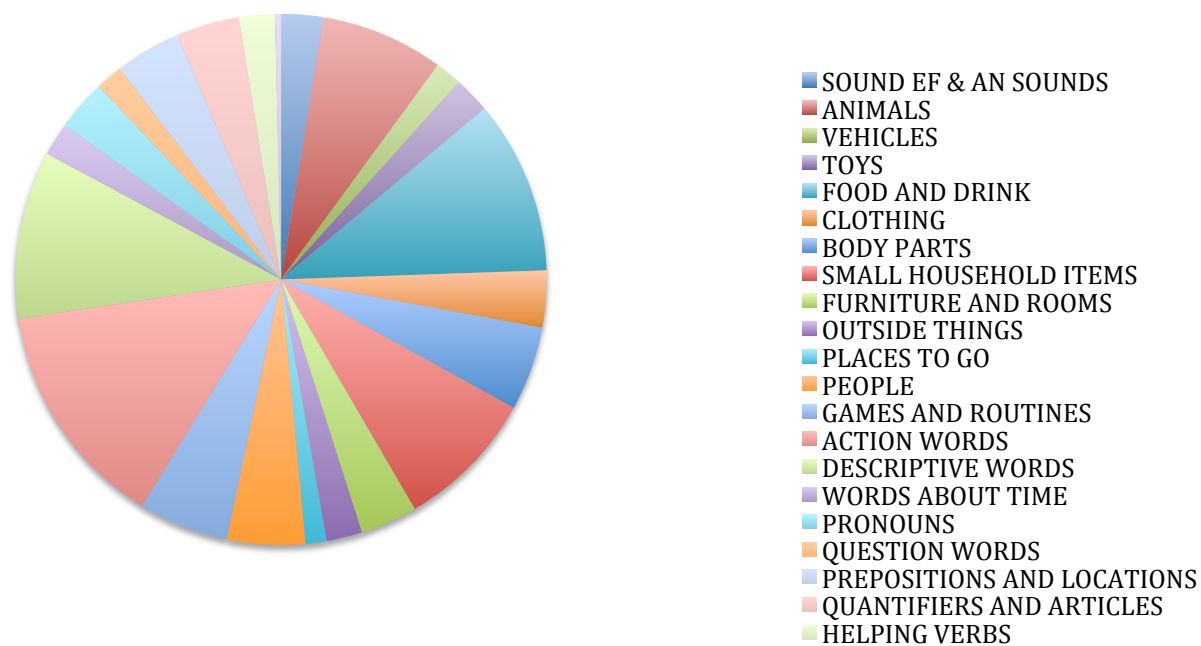


Figure 6: proportion of words vanished from each category out of total number of words vanished in hearing-loss group

The hearing loss group exhibited instances of vanishing words, but to a much smaller degree than the typical-hearing group. This could be for several reasons. Parents of children who are deaf/hard of hearing may be much more attentive to their child's language production, leading to less parent error. Also, the hearing-loss groups' parents filled out the form about every 6 months, giving the parents more time in between visits to recall their children's language, possibly leading to less vanished words because filling out the form more often could be more representative of instability.

These findings did not lend much information as to *why* these words might be vanishing so they were further looked at in terms of the age the words in the categories were acquired.

#### *Vanished Words and Age of Acquisition*

After looking at the categories of vanished words, the age of acquisition of the categories with the most vanished words were looked at. The average ages of acquisition for the words in each category can be seen in figure 7.<sup>3</sup>

Column1	Category	Average Age of Acquisition
1	Sound Effects and Animal Sounds	17.75
2	Animals (Real or Toy)	23.06976744
3	Vehicles (Real or Toy)	22.64285714
4	Toys	22.5
5	Food and Drink	23.41176471
6	Clothing	24.14285714
7	Body Parts	21.48148148
8	Small Household Items	23.6
9	Furniture and Rooms	24.84375
10	Outside Things	24.41935484
11	Places to Go	26.36363636

<sup>3</sup> The ages of acquisition for words in the category prepositions and locations were not available

12	People	24.55172414
13	Games and Routines	21.28
14	Action Words	25.17647059
15	Descriptive Words	25.74603175
16	Words about Time	28.5
17	Pronouns	27.96
18	Question Words	28
19	Quantifiers and Articles	28.35294118
20	Helping Verbs	28.76190476
21	Connecting Words	30.16666667

*Figure 7: Average Age of Acquisition for the words in each category*

For the typical-hearing group, the categories with the most vanished words proportionally were pronouns, followed by quantifiers and articles, and then sound effects and animal sounds. Words in the pronoun and quantifiers (e.g. some, as in “some grapes”) and articles (e.g., “the” or “a”) groups are acquired on average at 27.96 and 28.35 months respectively, while sound effects and animal sounds are acquired on average at 17.75 months. A possible explanation for this would be that words acquired very early or very late are more prone to vanishing because they are used less at a later age, and are not used enough at an early age. In this case, sound effects and animal sounds such as “baa baa” might vanish later because children no longer use animal sounds to identify animals; i.e. moving on to sheep instead of baa baa with age.

For the hearing-loss group, the categories with the most vanished words proportionally were question words, followed by quantifiers and articles, and then games and routines. Words in the question words and quantifiers and articles group are acquired on average at 28 and 28.35 months respectively, while games and routines are acquired on average at 21 months. The explanation could be the same here as it was for the typical-hearing group.

Comparing age of acquisition to category word loss opens up the idea that the age at which words are acquired could influence how words come and go. Average ages of acquisition imply that when children acquire words, their peers may be acquiring them at the same time, reinforcing word use or aiding in word loss.

### **Discussion**

From this research, the most interesting observation was that late-talkers tended to have more vanished words than early talkers. This finding adds to what could be known about late and early talkers. With late talkers being more likely to have vanished words, it may suggest that late-talkers have less consistent vocabularies. Although it is difficult to make conclusions about why vanishing words occur, the original goal of the studies, identifying the children who tend to exhibit the phenomena more than others is a beginning. Furthermore, seeing that vanishing words occurred in more than one group of children was intriguing as well, offering the possibility that vanishing words exist beyond this study, and that looking at differences and similarities in vanishing words across different groups may be informative.

The present study was limited by sample size and uneven talker classifications. Even talker classifications could have bettered the study by enabling a more even comparison of early and late talkers. Also, lack of previous research on the subject was limiting in that there was nothing to compare the findings to and there were many directions that the research could have taken.

*Future Directions*

The initial goal of this research was to answer the question of why words come and go. Future work could be done on other longitudinal MCDI samples to see if the phenomenon continues with similar patterns. If words vanish in other longitudinal samples in a similar way, it could be possible to better understand vanishing words.

This work could influence how MCDIs are internally checked in labs. If there were certain categories that seemed to be more prone to vanishing in other populations, they could be double checked in labs. For example, if it was found that a certain category was more likely to vanish for a certain age, words in the category could be cross validated with other vocabulary measures, for example a picture identification or picture naming task.

Another future direction of this work could be to ask parents if they notice words coming and going from their children's vocabulary in order to see if this is a phenomenon that has been recognized by parents, especially in parents of late talkers. If parents have noticed words vanishing, their input could be helpful in further examinations.

If future work concluded that vanishing words are just a result of parent error, this research could be a way to inform better methods of constructing vocabulary measures. With 680 words, the vocabulary production section of the MCDI is very long, and filling it out by hand from month to month may not be the most accurate way to get the clearest picture of children's vocabulary.

Although a crude first look at the phenomenon of vanishing words, this study could overall lead to further research on children's vocabulary, at least becoming a consideration in evaluating MCDIs. Individual words coming and going from testing

periods may not necessarily influence how children are classified, but it is an occurrence that could be further investigated.

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## Appendix

A: First page of the MCDI form given to parents

**VOCABULARY FORM (MCDI)****Your Child's Name:** \_\_\_\_\_ **Your Child's Date of Birth:** \_\_\_\_ / \_\_\_\_ / \_\_\_\_**Today's Date:** \_\_\_\_ / \_\_\_\_ / \_\_\_\_ **For Office Use Only: Revision Date:** \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Children understand many more words than they say. We are particularly interested in the words that your child SAYS. Please go through the list and mark the words you have heard your child use. If your child uses a different pronunciation of a word (for example, "raffe" instead of "giraffe" or "sketti" for "spaghetti"), mark the word anyway. If your child speaks multiple languages, please mark the words your child says in any languages he or she knows (including sign language). Remember that this is a "catalogue" of all the words that are used by many different children. Don't worry if your child knows only a few of these right now.

**Sound effects and animal sounds**
 baa baa ☐  
 choo choo ☐  
 cockadoodledoo ☐  
 grr ☐

 meow ☐  
 moo ☐  
 ouch ☐  
 quack quack ☐

 uh oh ☐  
 vroom ☐  
 woof woof ☐  
 yum yum ☐
**Animals (Real or Toy)**
 alligator ☐  
 animal ☐  
 ant ☐  
 bear ☐  
 bee ☐  
 bird ☐  
 bug ☐  
 bunny ☐  
 butterfly ☐  
 cat ☐  
 chicken ☐  
 cow ☐  
 deer ☐  
 dog ☐  
 donkey ☐  
 duck ☐  
 elephant ☐  
 fish ☐  
 frog ☐  
 giraffe ☐  
 goose ☐  
 hen ☐  
 horse ☐  
 kitty ☐

 lamb ☐  
 lion ☐  
 monkey ☐  
 moose ☐  
 mouse ☐  
 owl ☐  
 penguin ☐  
 pig ☐  
 pony ☐  
 puppy ☐  
 rooster ☐  
 sheep ☐  
 squirrel ☐  
 teddybear ☐  
 tiger ☐  
 turkey ☐  
 turtle ☐  
 wolf ☐  
 zebra ☐