



**Word learning strategies during the one-word stage.  
 An analysis of one child's vocabulary and phonology and its  
 suggestions about how early words are learnt.  
 An observation of a 17 month old child who only has a few words,  
 and a 'grammar' of their current language.**

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Introduction

Early lexical production has long been the focus of language development research, in particular from the acquisition of the first word through to the production of two-word utterances, typically in between the ages of 1 and 2. Such research has included the patterns through which language is acquired, the content of early lexicons and the context of its use generally aiming to establish the 'modal child' and the expected benchmarks of early lexical production. The utility of such a model, however, has come into questioning as researchers (notably Bates et al. (1994)) argue that we should take individual differences and learning styles into account.

Macken (1980) has attempted to establish a standard and modal phonological development, outlining the 'statistical probability' of the order of acquisition of phonemes, based on the studies of various researchers. At 18 months a child produces the nasals [m] and [n]; the glide [w]; the liquid [j]; the stops [p], [t], [k] and []; and the fricative [h]. Vihman (1996:141) argues that early words are often phonetically 'accurate' due to the salience of certain words produced in the child's environment which fall within the phonetic range of the child's babbling. Common processes have also been established by Ingram (1986), by which many children substitute unknown phonemes. These include; 'stopping'; 'fronting'; 'gliding'; 'vocalization'; and 'vowel neutralisation'. Ingram has also identified common syllabic structures in their first words, stating that for most children, the direction is towards a basic CV structure. However, common processes from at 18 months include consonant reduction, the deletion of final consonants, the deletion of unstressed syllables, and reduplication. Such substitutions are the ways by which children overcome problems of production in place or manner in order to communicate a sound which is linked as closely as possible to the adult model.

Progressive phonological idioms are an example when such production problems are inexplicably overcome. They are words which are pronounced in an adult-like manner, but which contain phonemes that the child is unable to produce in other words. Researchers have been unable to establish the reasons for such phenomena, but the forms suggest that early word representations are of the whole word, rather than as separate phonemic segments (Hoff 2009:164).

During the transition from babbling to true words, infants often produce protowords. Such productions have been defined in many different ways (see Vihman (1996:130)) but Conklin (2010) has divided protowords into three categories. The phonetically consistent form has a standard sound pattern, but is not referentially stable, nor based on adult language. The pre-word is phonetically consistent and referentially stable, yet it not based on adult language. It is accurate in its categorisation, according to the adult model, yet the child has

found an individual way of communicating meaning. Finally, the sensorimotor morpheme is phonetically and referentially stable, and it is based on adult language, but cannot be communicated without the use of a supporting gesture, and is sometimes part of a routine.

A child may use a word in a context or manner which is inconsistent with the adult's. These extensions of words are common in the speech of 1 and 2 year olds, as Clark (1993:33) claims that they account for up to a third of their productions. The reasons for children's over- and underextensions remain unclear. Nelson et al. (1978) suggest that children may use their single words analogically to comment on similarities they have noticed, and Gelman et al. (1998) propose that children may overextend and use known words as semantic stand-ins for the words they do not know.

Data collected by Benedict (1979) suggests that the modal child at 1;5 months can produce in between 40 and 50 words. Similarly, a study by Bates et al. (1994) demonstrates that at the age of 1;4, the median number of words was 44, but this range extended from 0 to 347 words. This clearly highlights the wide variation in lexical development between the ages of 1 and 2.

A child's first 50 words has been the topic of much research and Katherine Nelson's monumental 1973 study provided a great insight into the patterns and variations of this stage of development. From the data she collected, Nelson categorised the children's words into six categories: specific nominals; general nominals; action words; personal social words; and grammatical function words. She chose such categories to avoid translation to grammatical-form classes and to try to link the vocabulary to a child's cognitive organisation. She found that nominals were the largest category, and such results have similarly been found in other studies. Anglin (1995) argues that early object names are functionally relevant and referentially salient and furthermore, maximally useful due the nature of parents' classifications. Gentner (1982) argues through his natural partitions theory that since nouns label objects in the physical world, the meaning encoded in them are easier to identify.

Although much has been done to establish a modal rate of development, most researchers agree that individual differences play a big part in a child's acquisition of language. Nelson's (1973) study was the first to establish groups of language learners, according to the number of object labels in their early words. Those with more than 50% general nominals in their vocabularies were called referential learners and those with less, expressive learners. As many have subsequently added however (see Goldfield & Snow 2005:299), these two types of learners lie at either end of a continuum with most children possessing aspects of both the referential and expressive learning style. Such differences may be a result of the type of input the child receives, and Nelson has reported that first children of middle-class families are more likely to be referential learners, whereas the expressive style is more common amongst children of the working class. The styles may also be representative of differences in a child's world view, as Nelson proposes that the two styles may be a result of the views children hold about language. Parallels have also been drawn between a child's rate of development and their language learning style as children with a referential learning style reached 50 words weeks or months earlier than expressive learners in Nelson's study.

Research has been conducted into the connection between phonological development and the rate of acquisition and the contents of a child's early vocabulary. Studies by Ferguson and Farwell (1975) and Stoel-Gammon and Cooper (1984) have demonstrated that children actively select words with sounds or with syllable structures that they are capable of producing, and avoid words with sounds and structures they cannot. Ferguson (1978) discussed the inverse relationship between phonetic accuracy and

vocabulary growth, proposing that a high rate of phonological accuracy slows lexical acquisition, a claim which was further supported by research by Stoel-Gammon and Cooper (1984).

In this paper, I will study the above issues in relation to a 17-month old infant and study her phonological and lexical development, reviewing any possible links between these two aspects of language development and discussing possible word learning strategies.

## **The Study**

### Methodology

The data was collected across two home visits over the space of one week. Prior to my visit, the mother of the child was asked to keep a notebook of words that the child produced and their contexts. Additionally, I designed a questionnaire based on the *MacArthur Communicative Development Inventories* (Fenson et al. 1994) (See appendix E). Although parents' notes can be helpful to record utterances over a longer period of time than the home visits, the observations of a parent would not be sufficient to draw reliable conclusions. The inventories on which questionnaire was based included the most common words produced by English-speaking children of the subject's age and the questionnaire would therefore remind parents of words their child had produced. It was also adapted for my own analysis, constructing the questionnaire based on both the infant and toddler CDIs, since my subject fell on the border of both age groups. Also, the inventories are representative of American-English vocabulary and I modified the terminology accordingly for a British study. However, the home observations were crucial to allow me to analyse the child's phonology and the context of the productions, since the inventories do not account for these aspects, and it was also necessary for me to visit the child in her home in order that the results were as typical as possible. During the visits, I observed and made notes on her speech productions and comprehension and used a picture book (*First 100 Words*) to track phonology and her mapping of meaning onto words. I recorded the sessions using a Sony ICD-BX800 Digital Dictation Machine.

### Subject

The data is from one child at the age of 1;5, Emma, from Hertfordshire, England. She is the first child of couple of working-class economic means. Her mother is the primary caregiver, a self-employed dance teacher and her father works in security. Emma had normal hearing and no obvious motor or cognitive deficits.

## **Analysis**

### Phonological development

*For a transcription of Emma's phonology, see appendix A.*

In terms of accuracy, Emma is very competent phonetically. 36% of her productions were adult-like and she is also advanced, showing ability to produce speech sounds which are expected from a child at 18 months, the age to which Emma is approaching. I am unable to comment on the order of acquisition of phonemes, but at the age of 17 months, Emma could produce the voiced bilabial oral stop [b], both the voiced [d] and voiceless [t] alveolar oral stops, the voiced velar oral stop [g], the bilabial nasal stop [m], the alveolar nasal stop [n], the labia-dental fricative [f], the voiceless alveolar fricative [s], the glottal fricative [h], and the bilabial/velar [w] and palatal [j] glides. Of these sounds, she shows preference for the [w] glide, included in 26% of her productions and the bilabial stop Ebb contained in 17%. Since Emma is still in the early stages of her phonological development,

claims for substitutions cannot be heavily substantiated, but there are some notable patterns. She shows a strong preference for the velar voiced oral stop [g] in her substitutions, using the consonant in three words, two of which being substitutions. She substitutes the 'harder' affricates (i.e. the palatal affricate [tʃ] in 'juice'), but she also unusually substitutes the alveolar stop [d], considered one of the 'easier' stops (i.e. [g, g, i] for 'daddy'). She also regularly substitutes the liquid [l] for the glide [w] (i.e. [Ewo] for 'aeroplane'), and affricates for stops ([tʃu] for 'shoo chop'). Emma also reduplicates vowel sounds regularly, notably the low unrounded front vowel [æ] ([naen], [mgæ]). She shows a tendency to delete unstressed syllables (i.e. [nm]) and omit the final consonant of a word ([awgo]), but these are less strongly substantiated. Emma produces complex phonotactic patterns since although she shows a preference for CV structures ([naenæ]) as Ingram's (1986) patterns predict, she also produces CVC structures GbAwD, without omitting the final consonant, and even expresses VCV structures, omitting the final syllable from 'aeroplane' [two]. She reduces the consonant cluster [kw] in 'quack', and shows a clear preference for reduplication, with 40% of her words demonstrating repetition of the initial CV syllable. This includes the protoword [bibi], yet many of these words are adult-like productions of words such as 'yum yum' and 'bye bye', and with such a small set of data, strong claims to preference are difficult to substantiate. Emma produces two progressive phonological idioms in 'hello' [lido] and 'hiya' [he0], articulating the sounds [h] and [l] which she is unable to produce in 'high chair' [g.] and ball [bAw]<sup>1</sup> and both these greetings are highly imitative of her mother's intonation.

### Lexical development

*For notes on the context of Emma's lexicon, see appendix B.*

Emma can produce 23 words, which is a relatively small vocabulary for her age. According to the data collected by Benedict (1979) Emma is delayed in her lexical development, though we have seen from the data collected by Bates et al. (1994) that variation at this stage is very common. It is important to note that 21 out of these 23 words are, however, true words. Besides these, she produces a sensori-motor morpheme in the form of 'bye bye' which is used to say goodbye, goodnight and to tell parents that she wants to have a nap, but only when she waves. This is almost certainly linked to the way she has been taught the word, always seeing it produced with the accompanying gesture. Since it is socially common for this word to be produced with a wave, her parents did not realise that she was unable to produce the word without the gesture and subsequently the word may remain as a sensorimotor morpheme until Emma's perception of the word changes. Emma also produces a pre-word pronounced [bibi], which is used to talk about anything with wheels. This pre-word is very similar phonetically to 'beep beep', and although this has never been used by Emma's parents, she may have heard it on television, and so it may be more closely related to a true word. 'It is, however, important to recognise that in the local dialect spoken in the child's environment such liquids as final consonants, as in 'ball' do tend to be pronounced as a glide [bAw].

Emma's mapping of meaning onto her new vocabulary does not always correlate with adult meaning, as I have demonstrated partially through her protowords. She also underextends a large proportion of her productions. For example, she produces the utterance [two] only when she hears an aeroplane flying above her house, yet is not able to identify one in a picture. She also only uses [bbae] to talk about herself, and not other babies or children. Such underextensions are representative of Emma's lack of exposure to language outside of her home environment. Overextensions are also common as she uses [wufwuf] to talk about

all animals, apart from ducks, for which she uses [wakwak]. 26% of Emma's productions are under- or overextensions, a figure roughly in line with Clark's (1993) research. Similarly, Emma produces the word [ta] regularly to say 'thank you', but only with her father. He regularly uses the word with Emma, whereas her mother would prefer her to learn 'thank you'. It would appear that Emma has underextended not the meaning of the word, but the context and environment.

I classified Emma's words into Nelson's (1973) lexical categories (see appendix C) and compared the results to the average found in the original study. Emma has a higher percentage of specific nominals, action words, modifiers (marginally) and personal social words, but fewer general nominals and function words. Combining the specific and general nominals, Emma's vocabulary is made up of 54% object labels yet contains no verbs. Of these nouns, the majority are those found or experienced in Emma's home environment (i.e. sound effects and animal noises; food and drink), and so are most readily identifiable and the object labels are spoken more by her caregivers.

Since Emma's vocabulary contains only 30% general nominals, she would fall into Nelson's expressive learner category, which also corresponds with the higher percentage of personal-social words. Yet in comparison with Nelson's (1973) subject Elizabeth who is an expressive learner, Emma uses half the percentage of personal-social words and a higher percentage of general nominals, suggesting that she is not as expressive on the continuum as Elizabeth (See appendix D).

### Discussion and Conclusion

It is clear that Emma is advanced in phonological terms for her age, commanding use of the majority of phonemes normally achieved by 18 months, according to Macken (1980), except the voiceless bilabial oral stop [p]. In addition to these, she produces the voiced velar stop expected at 2 years of age, and the labio-dental fricative expected at 3 years of age. This data is evidence against the theories that suggest there is a universal order of phoneme acquisition. We can establish that some phonemes are easier to articulate than others, due to biological development of the vocal chord, etc., but individual differences must be taken into account as a big factor in the acquisition. It must also be noted that command of phonemes which are considered more difficult to articulate may be examples of phonological idioms, especially considering the small amount of data. The phonological idioms that Emma produces support the theory that early word representations are of the whole word since they are highly imitative of her mother in terms of intonation. Emma's apparent phonological accuracy is also accounted for by Vihman's (1996) study of accuracy in early words and their relation anticipated regression as vocabulary grows.

Emma is a key example of an expressive learner in Nelson's terms, with a relatively low number of general nominals and a high number of social-personal words. Emma is also of a working class family and so supports Nelson's claim that language learning styles are related to economic class, and the type of input the child receives. Emma uses language to interact with the people in her environment, and uses the nouns in her vocabulary to socialise, rather than label objects that she sees, suggesting that she views language differently to the typical referential learner, as Nelson suggested. Anglin's (1995) theory that nouns produced are functionally relevant and conceptually salient was supported by Emma's data, with most deriving from her home environment. Although I cannot argue against Gentner's Natural Partitions theory (1982), since Emma's vocabulary is dominated by nouns and contains no verbs, her theory does not account for the use of personal-social words and their role in early communication. Emma was much more dependent on these as communicative tools than object labels, and so I argue that although objects are perhaps most salient, the utility of a

word in relation to a child's objectives is an important motive and one unrelated to the ontological categories which are developing as a child learns to speak.

Emma's overextensions are supportive of the claim by Gelman et al. (1998) that children use words in their vocabulary to stand in for unknown terms. Emma uses 'woof woof' for all animals apart from ducks, for which she has learnt 'quack quack', and I suspect that vocabulary for other animals will replace 'woof woof' as she acquires them. Emma's underextension of 'ta', related to the situation of its use, is an occurrence which I have not found in the literature, but I believe it can be accounted for if we adapt Nelson et al.'s (1978) theory. It seems that she uses the word analogically to comment not on the referent of a word, but the environment in which it is used. I would argue that Emma is a very careful language learner, and does not attempt to use words in different contexts to those in which she has heard them. This may be another factor that accounts for her slower lexical development.

Emma's small vocabulary coupled with her advanced grasp of phonology supports the claims by Ferguson (1978) and Stoel-Gammon and Cooper (1984) that high phonetic accuracy slows lexical acquisition. It seems that Emma focuses on producing fewer words correctly, in an adult like manner, as opposed to producing a higher quantity with lower accuracy. The rate of acquisition could also be related to Emma's expressive learning style, which Nelson (1973) demonstrated to be slower than that of a referential learner.

The content of Emma's vocabulary and its link with her phonological productions is difficult to substantiate as I have not collected the order of acquisition of her vocabulary, though her preference for particular phonemes may be indicative of the connection. Further observation of Emma's productions at 18 and 20 months would show if these preferences have led to the shaping of her vocabulary.

The data I have collected on Emma is small and so precludes the ability to make universal statements based solely on these results. I have been able, however, to provide a detailed analysis of individual patterns of development which has shone light on some aspects of single-word productions and the tools by which they are learnt. This paper can also be used alongside other studies to establish a wider view of this stage of development, and as a testing ground for future research projects. It can also lead to further study of the same child, forming part of a longitudinal study.

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