

NOTES

**Developments in early lexical comprehension: a
comparison of parental report and controlled testing***

MARGARET HARRIS AND JOAN CHASIN

Royal Holloway, University of London

(Received 6 August 1996. Revised 30 September 1998)

ABSTRACT

Six children were studied from the age of 0;6 to 1;6 in order to chart their developing comprehension vocabularies from the first to the 100th word. Observational data were used in the first instance to identify newly comprehended words and then controlled testing was carried out for each word to confirm and expand the observational data. Comprehension of words was divided into four categories – object names, context-bound object words, action words and personal names. The relative frequency of the different categories of word was found to change with the size of the comprehension vocabulary as personal names decreased in importance and both object names and action words became increasingly more common. There was considerable variation among the six children especially in the proportion of object names and action words that they understood but vocabulary composition became highly stable between 60 and 100 words.

INTRODUCTION

This paper compares data on early lexical comprehension derived from parental report with that from systematic experimental testing. A major source of data on the composition of early comprehension vocabularies comes from Fenson, Dale, Reznick, Bates, Thal & Pethick (1994) who describe an extensive sample of children whose vocabulary was assessed with the MacArthur Communicative Development Inventories (Infant Scale). These data are cross-sectional rather than longitudinal but they do provide important evidence about the first 50 words that children understand.

[*] This paper was written while the first author was in receipt of a Social Science Research Fellowship from the Nuffield foundation. The research was supported by grant number R000 23 2037 from the Economic and Social Research Council to the first author. Address for correspondence: Dr Margaret Harris, Department of Psychology, Royal Holloway University of London, Egham, Surrey TW20 0EX, UK.

Pooling data across subjects¹, Fenson *et al.* found that the words understood by the youngest children (aged 0;8) were the names of people or were related to games or routines. At 50 words, the main category was nouns² (comprising household items, animal names, toys, clothing, food and drink, body parts, furniture and rooms) which accounted for 48% of items. The other categories were games and routines (20%), actions words (16%), personal names (10%) and sounds (6%). By 1;4 – when mean comprehension vocabularies were reported as 192 words – 52% of words understood were nouns, 19% were verbs, 9% were words stemming from games and routines and 3% were personal names. (For a complete list see Fenson *et al.* (1994) table 16.)

The use of the MacArthur Communicative Development Inventory for the assessment of early comprehension vocabulary has been questioned since it relies exclusively on parental report. Although there is a long tradition of using parental report for reliable assessment of production it is less clear that this can provide equally reliable assessment of early comprehension since it is often difficult to determine from observation alone whether a child understands a word or is, instead, responding to non-verbal cues. As a result there may be a tendency for parents to over-report comprehension, particularly in the first year of life. Fenson *et al.* are aware of this potential criticism and they provide several arguments in favour of their data. However, as Tomasello & Mervis (1994) note, these arguments are not entirely convincing particularly in the case of very early development and there is good reason to suppose that the Fenson *et al.* (1994) data over-estimate early comprehension. Another potential problem is that parental reports – even when supplemented with an interview – do not necessarily provide detailed information about the precise context in which a word is comprehended. Without such information it is difficult to determine accurately which category a particular word falls into. In particular, a word may appear to be an object name but, in fact, understanding may be restricted to a single behavioural context in which case the word is context-bound rather than referential. There are many examples of such context-bound word use in early production (Bates, Benigni, Bretherton, Camaioni & Volterra, 1979; Dore, 1985; Nelson & Lucariello, 1985; Barrett, 1986; Harris, Barrett, Jones & Brookes, 1988; Barrett, Harris & Chasin, 1991) and so there is every reason to suppose that comparable patterns will be evident in early comprehension.

The aim of the present study was to chart the development of comprehension of the first 100 words using observation and controlled testing as

[1] Fenson *et al.* use a criterion of report by at least 50% of the sample in determining that a given word is comprehended at a particular age.

[2] The term 'noun' is used by Fenson *et al.* (1994) but it is arguable that words comprehended up to 16 months of age have the properties of nouns.

well as parental report. It was predicted that, overall, the rate of development of comprehension vocabularies would be significantly slower than that reported by Fenson *et al.* (1994). It was also predicted that, although the proportion of object names understood would increase with age, the mean proportion would be lower than that reported by Fenson *et al.* (1994) since genuine object name comprehension would be distinguished from context-bound comprehension of object words.

METHOD

Participants

Six children took part in the study, four boys (Ben, Andrew, Sebastian and George) and two girls (Katherine and Katy). All the children were first born and English was the only language spoken in the home. At the time of the first observation the children were 0;6 (range 0;5.24–0;6.06). Observation continued until the children were 2;0 although all children had attained a comprehension vocabulary of at least 100 words by 1;6. Data for the early production and comprehension of these children have been reported in Harris, Yeeles, Chasin & Oakley (1995a) and Harris, Barlow-Brown & Chasin (1995b).

Procedure

Assessment of comprehension. Full details of the procedure used to assess comprehension can be found in Harris *et al.* (1995a). Briefly, three different sources of evidence were used in the first instance. These were parental diary records, home observation (supplemented by videotaping) and a comprehension checklist which contained the most commonly understood words organized into categories (e.g. toys, food and drink, people, games, actions). The checklist was a modified version of the one used by Benedict (1977).

Once a new word was identified as appearing in comprehension, controlled testing was carried out to confirm parental reports and to determine the range of contexts in which a word was understood, most notably to distinguish between context-bound object words (which were understood only in a single behavioural context) and object names (which were understood in more than one context).

Classification of words. The first 100 words in comprehension for each child were divided into the four categories of personal names, object names, context-bound object words and action words.³ The criteria for this classification and examples of words in each category are shown in Table 1.

[3] Originally this category was further subdivided into three: context-bound action words, contextually flexible action words and an action game or request category. As the first two categories only accounted for a negligible amount of the total number of action words it was decided to use just one category for this group of words.

TABLE 1. *Examples of categorization of early comprehension vocabulary*

Category	Definition	Examples
Personal name	Unique name for people, family pets, favourite toys	<i>Lamby</i> – toy lamb used as comforter <i>Dylan</i> – family cat
Object name	Corresponding to Nelson's (1973) 'general nominal' category; only including words that were understood in at least two different behavioural contexts	<i>Cat</i> – family cat, novel picture of cats <i>Nose</i> – teddy's nose, own nose, mother's nose
Context-bound object word	Object words that were understood in only one behavioural context	<i>Bird</i> – when indoors, looks out of window to garden <i>Car</i> – waves on hearing word or sound of car
Action word	All words or phrases that were associated with actions rather than with objects	<i>Down</i> – squats down on haunches <i>Lunch</i> – goes to kitchen and attempts to climb into high chair

Assessment of production. The development of production was monitored through diary records, maternal interviews, home observations and video recordings. Details of the procedure are set out in Harris *et al.* (1995a). Briefly, a vocalization was counted as a word if it was reported in the diary record and observed either during home observation or in a videorecording. If there was no maternal report, three observations were required before a vocalization was counted. Unlike comprehension, controlled testing was only carried out if there was some ambiguity about the range of contexts in which the child produced a word as, for example, where a diary entry and an observation were not identical.

RESULTS

The proportion of words comprehended in each of the four categories was calculated for vocabulary sizes of 20, 60 and 100 words. The proportion of words in each category was found to change as the size of comprehension vocabulary increased (see Table 2). At the 20-word level, the number of personal names and object names was almost equal and together they accounted for two thirds of the total. The remaining two categories – context-bound object words and action words – each made up about one sixth of the total. At 60 words, the proportion of object names and action words had both increased while there was a marked decrease in the proportion of personal names. By the 100-word level the proportion of personal names had decreased even further and there was a corresponding rise in the proportion of object names. The proportion of action words remained the same as at the 60-word level as did the proportion of context-bound object words which was identical at all three points.

TABLE 2. Mean percentage (and range) of words in each category in relation to size of comprehension vocabulary

Vocabulary size	Personal names	Object names	Context-bound object words	Action words
20	32.5 (20-60)	35 (15-60)	15 (0-30)	17.5 (10-25)
60	18 (12-23)	40 (30-52)	15 (8-23)	27 (15-37)
100	15 (10-19)	43 (30-56)	15 (11-20)	27 (13-37)

TABLE 3. Total comprehension and production vocabulary at 1;4

Child	Gender	Comprehension	Production
Andrew	M	59	11
Ben	M	48	46
George	M	52	5
Sebastian	M	80	39
Mean Fenson <i>et al.</i>	M	150	30
Katherine	F	224	65
Katy	F	111	25
Mean Fenson <i>et al.</i>	F	210	95

Individual data for the six children reflected the overall pattern. The number of object names understood by each child generally increased with the size of their comprehension vocabulary. However there was considerable individual variation in the number of different categories of word understood at each stage. A summary of the range in proportion for each category is shown in brackets in Table 2.

Although there was considerable individual variation in the composition of early comprehension vocabulary, there was great stability from 60 words to 100 words. The correlation for proportion of object names at these two points reached the maximum value ($R = 1.00$, $p < 0.001$)⁴ and for action words it was also significant ($R = 0.82$, $p = 0.04$). The corresponding correlations between 20 and 60 word vocabularies were not significant ($R = 0.49$, $p = 0.33$ for object names, $R = 0.75$, $p = 0.09$ for action words).

Table 3 shows the relative size of comprehension and production vocabularies at 1;4. Most of the children had many more words in comprehension than in production with the exception of Ben, whose comprehension and production developed more or less in parallel. Katherine's comprehension vocabulary was well past the 100-word level by

[4] All correlations reported are Spearman Rank Order Correlations. A non-parametric correlation was chosen as a more conservative test in view of the non-normal distribution of the data.

this time and she had such a fast rate of acquisition that it was impossible to test all the later words that she understood. However, as very good observational and interview records were kept for her, the figure in Table 3 can be taken as an accurate estimate of the size of her comprehension vocabulary. The mean level of comprehension vocabulary at 1;4 was 96 words – considerably lower than the median of 169 words reported by Fenson *et al.* (1994). However, Katherine's vocabulary of 224 words did come close to the figure of around 250 reported by Fenson *et al.* as cutting off the 75th percentile. Table 3 also shows the extent of the range of vocabulary size at 1;4 and provides further evidence that, in this early period of acquiring language, children show highly individual patterns of development.

DISCUSSION

Our data support the finding of earlier studies that the proportion of different classes of words comprehended changes with vocabulary size (Benedict, 1977; Bates, Bretherton & Snyder, 1988; Gunzi, 1993; Fenson *et al.*, 1994). Personal names figured prominently in early vocabulary but they made a relatively smaller contribution as the total number of words understood by the children increased. This decrease in the importance of personal names occurred as the proportion of both object names and action words increased. The proportion of context-bound object words remained stable throughout the period of development.

At 60 words, the mean proportion of object names was 40%. This is very comparable to Benedict's (1977) data for 50 words but somewhat lower than the 48% reported by Fenson *et al.* (1994). The mean proportion of action words at the same vocabulary size was 27% which was considerably lower than the proportions reported by both Benedict and Gunzi for 50 words but very similar to the total proportion reported by Fenson *et al.* for action words plus words related to games and routines (both of which were classified as action words in the present study). Our data suggest that some early words that appear to be object names are, in fact, context-bound object words and that a parental checklist may, therefore, over-represent the number of object names. There is also some suggestion from our data that parents over-estimate the number of words that children understand since even the most precocious child that we tested attained a score that was under the 75th percentile on the Fenson *et al.* norms; and there was a considerable discrepancy between the mean comprehension scores of our sample and that of the Fenson *et al.* sample even when scores for girls and boys were treated separately.

There was wide individual variation in the frequency with which both object names and action words were understood, confirming the findings of both Bates *et al.* (1988) and Fenson *et al.* (1994). Furthermore, by 60 words,

a stable pattern of comprehension vocabulary style was established such that there was a very close relationship between the relative composition of vocabulary at the 60- and 100-word level.

In the six children studied there was a weak relationship between lexical comprehension and production. This dissociation between comprehension and production appears to be due in part, as Bates *et al.* (1988) and Fenson *et al.* (1994) have reported, to children who understand a great deal but say very little. Katy fits into this pattern (see Table 3). At 1;4 she understood over 100 words but had produced only 25. Table 3 also shows that another child, Ben, showed an equally exceptional pattern in that he understood and produced a similar number of words. He was also exceptional in showing a lag of only 14 days between comprehension and production of his first word (Harris *et al.*, 1995a) and these two modalities continued to be mirror images of each other until at least 1;4.

One final issue that is worthy of comment concerns the existence of a spurt in the development of comprehension and production vocabularies. Reznick & Goldfield (1992) have claimed that, for many children, a spurt in comprehension vocabulary occurs at the same time as a spurt in production. Their evidence for the timing of the spurt came from children's performance in a visual preference task in which comprehension of 15 selected words was tested at two-monthly intervals. There was an increase in the number of words understood from the start of the study at 1;2 to the end at 2;0 with individual children showing an apparent spurt in the number of words understood somewhere between 1;4 and 1;10. This age range is considerably later than that for the comprehension spurt shown by the children in the present study which occurred between 0;11 and 1;3. This age range (which is a conservative estimate given that it is based on testing rather than observation) is in line with the mean age of around 1;0 reported in the Fenson *et al.* (1994) data. The similarity of our own findings to those of the parental report data from Fenson *et al.* strongly suggests that the spurt reported by Reznick & Goldfield is some months later than the primary spurt in the development of comprehension vocabulary.

There are two possible explanations for the later increase in rate of development of comprehension vocabulary reported by Reznick & Goldfield. One possibility is that they are reporting a secondary increase in the rate of comprehension vocabulary development. The alternative explanation is that the exacting demands of the visual preference technique underestimated children's ability to understand words. Neither our own data nor those of Fenson *et al.* provide evidence about the development of comprehension beyond 1;4 so they do not rule out the possibility that after an initial spurt around 1;0, there is a secondary and later increase in the rate at which new words are understood in the age range that Reznick & Goldfield investigated. However, as Reznick & Goldfield only began testing at 1;2, their study does

not provide evidence about developments in the earlier period that we investigated.

REFERENCES

- Barrett, M. (1986). Early semantic representations and early word usage. In S. A. Kuczaj & W. Wannenmacher (eds), *Concept development and the development of word meaning*. Berlin: Springer.
- Barrett, M., Harris, M. & Chasin, J. (1991). Early lexical development and maternal speech: a comparison of children's initial and subsequent uses. *Journal of Child Language* **18**, 21-40.
- Bates, E., Benigni, L., Bretherton, I., Camaioni, L. & Volterra, V. (1979). *The emergence of symbols: cognition and communication in infancy*. New York: Academic Press.
- Bates, E., Bretherton, I. & Snyder, L. (1988). *From first words to grammar: Individual differences and dissociable mechanisms*. Cambridge: C.U.P.
- Benedict, H. (1977). *Language comprehension in the 10-16-month-old infants*. PhD Thesis. Yale University.
- Dire, J. (1985). Holophrases revisited: their 'logical' development from dialogue. In M. D. Barrett (ed.), *Children's single-word speech*. Chichester: Wiley.
- Fenson, L., Dale, P., Reznick, J. S., Bates, E., Thal, D. & Pethick, S. J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development* **59**, No. 5, 1-173.
- Gunzi, S. (1993). Early language comprehension and production. Unpublished PhD thesis, University of London.
- Harris, M., Barlow-Brown, F. & Chasin, J. (1995). The emergence of referential understanding: pointing and the comprehension of object names. *First Language* **15**, 19-34.
- Harris, M., Barrett, M., Jones, D. & Brookes, S. (1988). Linguistic input and early word meaning. *Journal of Child Language* **15**, 77-94.
- Harris, M., Yeeles, C., Chasin, J. & Oakley, Y. (1995). Symmetries and asymmetries in early lexical comprehension and production. *Journal of Child Language* **22**, 1-18.
- Nelson, K. & Lucariello, J. (1985). The development of meaning in first words. In M. Barrett (ed.), *Children's single-word speech*. Chichester: Wiley.
- Reznick, J. S. & Goldfield, B. A. (1992). Rapid changes in lexical development in comprehension and production. *Developmental Psychology* **28**, 406-13.
- Tomasello, M. & Mervis, C. B. (1994). The instrument is great, but measuring comprehension is still a problem. *Monographs of the Society for Research in Child Development* **59**, No. 5, 174-9.