

The language development of children with Down's syndrome: First words to two-word phrases

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A longitudinal study was conducted to investigate the early language development of children with Down's syndrome. Using parental records of their children's speech, the study investigated very early language development, from first words to the consolidation of two-word phrases. Seventeen children were studied, all with Down syndrome and the age range of these subjects when the study began was one year to four years.

The mean age for reaching the ten word stage was 27.3 months, a delay of around 12 months. The results showed that the children with Down's syndrome studied here learned very similar words to those of typically developing children. The results also indicated that, as with typically developing children, some children with Down's syndrome experienced a "vocabulary explosion". The mean age for this language explosion was 30 months, with a mean vocabulary of 24.4 words. However, it was clear that there was a wide range of individual differences with some children showing no "explosion." The mean age for two-word phrase consolidation was 36.9 months, suggesting a delay of around 18 months. The results indicated that, having reached the ten word stage, children with Down's syndrome proceed in their language development at a slower rate to a two-word stage than typically developing children. Detailed individual profiles are included to illustrate the wide range of individual differences observed in the rate of language acquisition in this group.

Acknowledgement

The authors wish to thank the parents who collected the data for the study, which was funded by the Portsmouth Down's Syndrome Trust.

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Down Syndrome Research and Practice
1994, 2 (2) 71-75

Introduction

It is well known that, in the early stages of language learning, children will imitate adult speech. As single word speech develops into sentences, the question of how much imitation is involved becomes more difficult to answer because the child will often produce utterances which he or she has never heard in adult speech, such as "me no want milk".

Research into the difference between the imitations of typically developing children and those of children with Down's syndrome seems to imply that, while "normal" children *selectively* imitate (Bloom et al 1974), children with Down's syndrome appear to imitate different words from those used in later spontaneous speech (Coggins and Morrison 1981). However, Gunn (1985) warns that caution should be taken when forming definite conclusions from these findings. In general, according to Gunn, studies show little or no significant differences between the imitation of children with Down's syndrome and that of typically developing children, and thus there is a great necessity for longitudinal studies to show whether, like typically developing children, a significant proportion of the imitations of children with Down's syndrome occur in their later spontaneous speech.

Typically developing children begin to produce imitated speech words at around 10 to 13 months of age (Gillham 1979) and spontaneous speech tends to occur between 12 to 18 months (Gleitman 1984 : Nelson 1981). Research by Cardoso-Martins et al (1985) has shown that, at the onset of object word comprehension and production, children with Down's syndrome are at a very similar level of cognitive development to typically developing children, although, of course this does not necessarily mean that they are of similar chronological age. Gillham (1979) suggests that children usually begin to produce spoken language when their mental age reaches around 15 months.

Most researchers agree that spoken language, at least in the early stages, "maps on to" the concepts and categories which the child had developed before language production begins to develop, and that this factor is reflected in what the child talks about (e.g. Nelson 1973). This appears to be true of both typically developing children and those with Down's syndrome alike. Detailed investigation by Gillham (e.g. 1979, 1990) has indicated that the words included in the early vocabularies of Down's syndrome children are strikingly similar to those of typically developing children. However, Gillham also points out that the rate of acquisition in children with Down's syndrome tends to be slower than in typically developing children. Cardoso-Martins et al (1985) argue that this slower paced language acquisition is due to specific cognitive deficits in children with Down's syndrome.

By the time the typically developing child reaches around 18 months of age, the pattern of language development changes. Within the next few months, with somewhere in the region of twenty words in his or her vocabulary (Nelson 1981: Miller 1989) the child may experience a period of very rapid vocabulary acquisition. Although not all children experience this (Nelson 1981), but rather increase their vocabulary in a gradual and steady manner, this vocabulary explosion is common. The change is a dramatic one. The child will increase his or her rate of language acquisition from three to four new words per month to thirty to fifty new words per month (Nelson 1981).

As yet, it remains unclear whether children with Down's syndrome experience a similar language acquisition explosion. Miller (1988 and 1989) believes that some children with Down's syndrome do indeed show evidence of a period of rapid language acquisition at a mental age of around 30 months, with a vocabulary of about 45 words. These findings indicate that children with Down's syndrome are not only delayed in reaching this stage, but, interestingly, that they also have more words in their vocabulary. Rondal (1978) believes that this may be due to their advanced chronological age reflecting more linguistic (and non-linguistic) experience.

The next major change in language development for both typically developing children and those with Down's syndrome is the onset of multi-word speech, often beginning with phrases consisting of just two words such as "hello dolly" and "mummy drink." For most children this usually occurs at around 19 months to two years of age, with around fifty words in their vocabulary (Nelson 1973). The onset of multi-word phrases is delayed in children with Down's syndrome, although the extent of the delay is very variable due to the high influence of individual differences in the development of the children (Miller 1989). However, as a guide line, Rondal (1988) suggests that the first multi-word utterances do not usually appear in children with Down's syndrome before a chronological age of around four to five years.

Miller (1989) believes that children with Down's syndrome may be: "demonstrating well developed referential vocabulary acquisition skills but deficiencies in the grammatical marking of their lexicon."

In addition, Miller indicates that at 20 months (mental age) his children with Down's syndrome were delayed by six months in productive language development, but show a progressive deficit and are delayed by ten months at a mental age of 30 months.

For many years it was believed that the language development of children with any type of learning disability was simply a delayed reflection of typical development. However, as shown above, recent research has shown that, despite similarities with the development of typically developing children, language learning, certainly in children with Down's syndrome is not just a slow motion version of typical language development. Although the differences may be subtle ones, they must not be ignored.

In this study, we report the progress of 17 children with Down's syndrome through the first word to two-word stage, noting the range of first words, evidence for a vocabulary explosion and the age at which two word phrases appear.

Method

The data, results and conclusions discussed here are based on parent kept diary records on seventeen children, all with Down's syndrome, ten females and seven males. Families volunteered to take part in this study, by post from around the U.K.

Firstly, all families were given an explanatory letter stating the initial aims of the study. Parents were told that the experimenters wished to study the same group of children over a number of years to learn as much as possible about language development in children with Down's syndrome.

Parents were then informed what information they would need to record, depending on the developmental stage their particular child had reached. Base-line information was then acquired from the parents by way of an initial record sheet which included basic information about the child, such as name and sex as well as the child's present stage of speech and language development.

In the following months, parents were given new record sheets once a month, and encouraged to continue keeping records as long as possible. The first of these record sheets for each of signing, single word speech, spoken phrases (two or more words together) and reading, was accompanied by a guide to record keeping for the parents.

Records indicated the date the word, sign or phrase was first used, whether it was an imitation or spontaneous production, who it was directed at and any relevant comments on the context in which it occurred.

Parents received advice from a psychologist at the Sarah Duffen Centre while in the study, so joined the study as they wished, hence the age variation at the outset. Some families maintained records over longer periods than others. If we had data on a child's early lexical acquisition to ten words and later, and/or we had data on the onset of two-word phrases, they are included in this analysis.

Results

There were a total of 17 children, seven male, 10 female with a mean age of 25.6 months and an age range of one year to four years at the beginning of the study.

Table 1 shows the age range of the children at each stage of the study and the mean ages at each stage. In addition, Table 1 shows separate age ranges and mean ages at each stage for male and female children. Mean ages are calculated in months.

First ten words

Data on the first 10 words learnt by children with Down's syndrome was acquired from nine of the 17 children, four males and five females. The age range for reaching this stage was 19 to 38 months and the mean age was 27.3 months.

Of the 90 words recorded as the first ten words of the nine children, there were a total of 42 different words. The most frequently used word was "Daddy" closely followed by "Mummy" and a person's name and "bye-bye".

Table 2 illustrates the full range of words used in the first ten words of this group of children.

Vocabulary explosion

It appears that the children studied here show that there may be an explosion of language acquisition (as recorded in typically developing children e.g. Nelson 1981) in some children with Down's syndrome but not all. In the group of twelve children for whom continuous records are available from ten words to two-word phrases, five show a clear "explosion" in acquisition and their language profiles are described below. The mean age for this explosion for the five children was 30 months. The age range was 28 to 32 months and the mean number of words in the vocabulary at this explosion was 24.4 words (the range was 16 to 36 words).

Records of "A. L." show that she has no words in her vocabulary at the beginning of the records and she does not start producing any words until she is in her 34th month. Within this month she reaches, and passes, the 10 word stage and rapidly, by the age of 24 months she has a vocabulary of 20 words. Over the next three months, she learns no new words, but then, at 28 months with her vocabulary still at 20 words, her language development seems to take off and her vocabulary climbs dramatically over the following months. She learns 14 new words at 28 months and more than 20 new words per month at both 29 and 30 months. In the final month she learns 30 new words (plus six 2-word phrases) bringing her vocabulary to 109 words as two-word phrases are consolidated at 31 months. Thus, from learning a mean of four words per month in the first five months of language acquisition, she seems to experience a "spurt" in development to learning an average of 22.3 words per month in the last four months before reaching the two-word phrase stage.

The records of "F. M." begin at 12 months with no words in her vocabulary and her language acquisition does not start until 17 months. It takes her seven months to bring the total number of words in her vocabulary to just over the ten word stage (giving a mean of 1.4 words per month from 18 to 24 months) and a further four months to reach over the 25 word mark (a small increase in mean words learnt per month to 3.8 words). At this point, with 26 words in her vocabulary, her language acquisition picks up considerably, learning twelve new words (plus two two-word phrases) at 29 months and ten words (plus seven two-word phrases) in the final month as two-word phrases are consolidated at 30 months. This gives a mean of 11 words learnt per month after reaching a vocabulary of 26 words. She has 48 words in her vocabulary when two-word phrases are consolidated.

The records of "A. T." begin at the age of 16 months when he has just one word in his vocabulary, and he learns no new words in the first month. Over the following twelve months, he learns only seven new words, bringing him to just under the ten word mark, with a mean of 0.6 words learnt per month at this stage (up to 29 months). He then learns seven new words in the next month bringing the size of his vocabulary to 15 words, but in the following month he learns no new words. The next ten words are again learnt in just one month, but no new words are learnt in the next two months. Then, however, with a vocabulary of 25 words, his rate of language acquisition increases dramatically and he learns 26 words in one month bringing his total vocabulary to 51 words at 33 months. In the final month when two-word phrases are consolidated (36 months) he learns just four words bringing his vocabulary to 55 words.

"H. A." has ten words in her vocabulary already when her records begin at the age of 29 months. In the next three months she learns a mean of 1.7 words per month, increasing her vocabulary by just five words. At this point, at the age

		Start of records	10 word stage	2 word phrases consolidate
All subjects	Number of subjects	17	9	14
	Age range (months)	12 to 48	19 to 38	25 to 52
	Mean age (months)	25.6	27.3	36.8
Males	Number of subjects	7	4	4
	Age range (years:months)	12 to 41	19 to 38	36 to 52
	Mean age (months)	25.1	27.8	42.5
Females	Number of subjects	10	5	10
	Age range (years:months)	12 to 48	22 to 36	25 to 49
	Mean age (months)	25.9	27	34.6

Table 1. Age at which children reach 10 word and two word phrase stages.

Word	N	Word	N	Word	N
Daddy	7	Up	3	Duck	1
Person's name	5	Ball	2	Gone	1
Mummy	5	Shoe	2	Hat	1
Bye-Bye	5	More	1	Lady	1
Dog	4	Arrow	1	Me	1
Car	4	Bag	1	Out	1
Yes	4	Bear	1	Roll	1
Baby	4	Bed	1	Teeth	1
Hello	4	Bib	1	Tried	1
No	3	Biscuit	1	Toilet word	1
Ta	3	Bowl	1	Window	1
Teddy	3	Brick	1	Dance	1
Wassat?	3	Chair	1	Doll	1
There	3	Cat	1	Dog	1

N = number of children with this word in their first 10 words.

Table 2. Words used in the first 10 word vocabularies of the children.

of 32 months and with a vocabulary of 15 words, the rate of her language acquisition increases and she learns 13 words in the next month (plus two two-word phrases) followed by ten words in the next (plus three two-word phrases). Thus she brings the mean number of words learnt per month to 11.5 words in the final two months, with a vocabulary of 38 words when two-word phrases are consolidated at 34 months.

"K. G." has 24 words in her vocabulary at the age of 27 months when the records begin. Over the next three months, she learns new words at a steady rate, bringing her vocabulary well over the 30 word mark with a mean of 5.7 words learnt per month. At this point, with a vocabulary of 36 words at the age of 30 months, her rate of language acquisition seems to take off, as she learns 28 words (plus four two-word phrases), 13 words (plus one two-word phrase) and 25 words (plus two two-word phrases) respectively in the following three months. This gives a mean of 22 words per month in these final three months when two-word phrases are consolidated at 33 months. She has 102 words in her vocabulary at this stage.

These five children show a clear language acquisition explosion at the point of having 20 words, 26 words, 25 words, 15 words and 36 words in their vocabulary, with ages of 28, 28, 32, 32 and 30 months respectively. The individual results give a mean number of words in the vocabulary at the beginning of the rapid language acquisition stage for the five children of 24.4 words and a mean age of 30 months.

Both the size of the vocabularies, and most surprisingly, given the possible variety of individual differences and the variation of ages for these children at the ten word stage, the ages at the onset of the rapid language acquisition period are incredibly similar. That is, at the point where the five children seem to experience the period of language acquisition spurt, the age range is just 28 to 32 months and the range in the vocabulary size is 15 to 36 words.

There are a further seven children for whom it is possible to detail their rate of vocabulary acquisition month by month. However, for these seven children, evidence of a rapid spurt in language acquisition is less obvious.

Nelson (1981) states that, in typically developing children, although a period of vocabulary explosion is common, there are individual differences, as well as large variations in the age of the vocabulary spurt:

"... some children never spurt at all, plugging away, adding a few words each week, and gradually increasing their rate of acceleration ..."

This may account for the lack of obvious language acquisition explosion in the remainder of the children recorded here, especially "H. H.", "D. V." and "E. C."

In addition, it is noticeable that in four of the seven cases, that is, "V. W.", "T. M.", "M. T." and "M. M.," the children have consolidated two-word phrases by the time their vocabularies are around the 20 to 30 word stage.

In the case of "V. W." for example, she has a steady climb to a vocabulary of just 21 words when two-word phrases are consolidated at 41 months. Similarly "T. M." gradually in-

creases her vocabulary to 22 words at which point two-word phrases are consolidated when she is aged 25 months.

"M. T." does not seem to have a smooth climb in his language acquisition, learning a few words at a time, with long breaks of several months where no new words are learnt at all. However, when he has 16 words in his vocabulary, there is a definite change in the pattern and he steadily learns a few words each month. The change, which it would be dubious to call a language explosion, may have been the beginning to such a spurt. Unfortunately, this can only be speculation since records of his later language acquisition (past a vocabulary of 27 words) are not available.

The same is true of "M. M." for whom, past a vocabulary of 21 words there are no records.

For the children for whom a language acquisition explosion is evident, it should be noted that it is much less dramatic than for typically developing children. The explosion in typically developing children is signified by learning 30-50 new words per month during the appropriate period. For the children recorded here, the explosion was very variable, but tended to be up to only around 10-30 new words per month.

Two-word phrases

The mean age for the consolidation of two-word phrases was taken from fourteen children, four male, ten female, nine of whom there are records for concerning their first ten words. These are shown in Table 3.

The mean age for reaching this stage was 36.9 months. For males, the mean age was 42.5 months and for females was 34.6 month. Although it appears that there is a large diversity between the means for males and females, it is probable that, due to the considerable individual differences involved, there is too big a difference between the number of children of each sex recorded for the results to be reliable when separated by sex. The age range for reaching the two-word phrase stage was 25 to 52 months.

The mean size of vocabulary at the point of two-word phrase consolidation was 54.4 words; this was calculated from the ten children for whom the relevant information on total vocabulary was available. However, the range of vocabulary size, which was 21 words to 109 words, indicates the importance of looking at the individual results as the means can be very misleading.

From previous research such as that of Nelson (1973) (as cited by Miller 1988) it seems that, in the language development of typically developing children, the onset of two-word phrases occurs at around 19 months with a vocabulary of about 50 words. Thus, from the means of the results recorded in this study, it appears that, individual differences apart, children with Down's syndrome have, on average, a similar number of words in their vocabulary at the two-word phrase stage, but that, age wise, they are delayed to the extent of about 18 months.

As previously discussed, the children with Down's syndrome recorded here tended to be already delayed at the ten word stage by around 12 months.

For this reason, the initial delay (that is, 12 months) was deducted from the *individual* ages at two-word phrase con-

solidation. It can be seen that the mean age for reaching this stage was then just 24.9 months which is a six month delay. The range of individual "adjusted" ages was 13 months to 40 months which clearly indicates, as all the other results have, the wide range of individual differences seen in the acquisition of language in children with Down's syndrome.

Comment

The records from which this data is taken do not contain information on variables which might explain the individual differences recorded. These may include hearing status of the child, language learning opportunities and styles of intervention. Further research to identify, if possible, the reasons for this wide variation would be valuable to parents and therapists.

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	Sex	Age record begin	Age 10 word stage	Age 2 word stage	Age 2-word phrases adjusted to account for estimated 12 mth. delay at 10-word stage
"A. L."	F	21	23	31	19 Months
"M. M."	M	16	24		
"F. M."	F	12	23	30	18 Months
"T. M."	F	17	22	25	13 Months
"E. C."	F	27	31	39	27 Months
"E. O"	M	12	19		
"M. T."	M	24	38		
"A. T."	M	16	30	36	24 Months
"V. W."	F	24	36	41	29 Months
"H. A."	F	29		34	22 Months
"K. G."	F	27		33	21 Months
"H. H."	F	25		33	21 Months
"N. H."	F	48		49	37 Months
"F. K."	M	32		40	28 Months
"M. N."	M	41		42	30 Months
"L. O."	F	29		31	19 Months
"D. V."	M	35		52	40 Months

Table 3. Individual profiles for early language production.

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