

Introduction

Learning centred (not nativist) view of what a child has to do when learning their first words.

Word Comprehension:

- i) Identity word from speech stream
- ii) Remember what it sounds like so it can be re-recognised
- iii) Link the word to an object or event

Word Production:

- iv) Repeat the word sound
- v) Say the word in the right context

Production requires more skill than comprehension. Different to adult experience of learning another language (as babies don't know any words at first).

Recognising Speech

First two skills required are to recognise & remember speech sounds, followed by the ability to segment the words from the speech stream. **Richards et al** - starts before birth.

Prenatal speech learning - Decasper and Spence

"Cat in the Hat" 6 weeks before birth, repeated twice a day. At 2-3 days old, babies played a recording of the story or another one after base-lining sucking response, when a dummy was sucked. Found babies who heard "Cat in the Hat" increased rate of sucking. Concluded it was the story they heard and responded to, not just their mother's voice.

Second study found a clear difference in unborn babies when hearing familiar/unfamiliar rhymes. Decrease in heart rate shown even if it wasn't their mother reciting the rhyme.

Babies prefer the human voice over other sounds - e.g. music. **Mehler & Dupoux** found this initial preference

Book 3 Chapter2 - First Words

becomes more specific - at 4 wks, preference is for mother's voice over other female voices.

They rapidly develop a preference for familiar languages. **Mehler** - 4 day old French babies heard both French and Russian; as can be predicted from Decasper and Spence, French was preferred.

Babies use prosody to distinguish languages - **Christophe and Morton** - comparison of reactions in 2 m.o. to Japanese v English and English v Dutch. Sucking method used to test. Japanese not considered native by the babies; but a portion of them considered Dutch to be native - suggesting a transition period while babies are refining how they distinguish their native language.

Infants use prosodic clues to segment speech and these are used to find the beginning and ends of words, recognise voices and distinguish different languages.

One possible prosodic clue is syllable stress (very regular in Italian and Greek, less so in English). A non-prosodic clue is syllables occurring together - transitional probability - the idea that particular pairs of syllables are more likely to occur together than other pairs.

Transitional probabilities - Johnson and Jusczyk (1)

8m.o. participants. Invented four words from twelve syllables - pakibu/tibodu/golatu/daropi

Familiarisation phase - words repeated in random order for 3 minutes. Therefore sequences of syllables that form words occur more often.

Test phase - presented with all the words they had heard plus part words - e.g. tudaro is the last syllable of golatu and the first two of daropi.

Found infants spent longer listening to the part words than words - as would be expected through infant's

preference for novelty.

(2) - investigated the role of syllable stress in word boundary detection.

Similar process as (1) - familiarisation followed by a test phase. Every time a part word appeared it was stressed on the first syllable.

Found infants listened to words longer than part words - opposite finding to (1). Means that they perceived part-words as more familiar than words.

Implies that during familiarisation, infants paid more attention to stress cues than transitional probabilities.

Conclusion from the two studies is that prosodic clues such as stress are more important than transitional probabilities in detecting word boundaries.

Understanding First Words

In order to understand, infants have to identify, then link words to objects or events. **Bruner** realised that children encounter language in very familiar social contexts, therefore they hear speech that relates to things they are already familiar with.

Harris - diary study of Francesca - learnt to associate the phrase 'Are you ready?' at 4.m.o. with the routine of nappy changing that had been constant from 3m.o. - and example of what **Bruner's** theory describes.

Harris et al - Majority of a mother's utterances refer to objects or events the child is currently attending to.

Associations can only happen if a child has some way of deciding what the adult is talking about - what cues are being used? Two are significant - direction of gaze combined with head turning, and pointing. They help establish what someone is referring to when they are talking. Pointing is the more accurate clue for both adults and children (**Butterworth**).

Baldwin - infants spend significantly more time looking at an object when pointing is used than if no pointing occurs. When an adult named the object and pointed, even more time was spent. Children are therefore predisposed to attend to objects that are singled out using both cues.

Harris et al found an even closer relationship - the age at which a child first points is highly correlated with the age at which they show understanding for the names of objects.

Suggests these are closely interlinked processes (pointing and word comprehension). Studies of blind children (**Norgate**) show that they produce significantly fewer words for discrete objects - supports the importance of pointing when acquiring object names.

Comprehension seems to start at around 7-8m.o. Typical words are the child's own name, mummy, daddy, clock, drink, teddy. (**Harris et al**). Much other evidence is from parental reports. Standardised information can be collected by using the MacArthur Communicative Development Inventories. **Fenson et al** have used these extensively to collect information on 8-28m.o. children.

Harris et al - study of 6 children using observation and MacArthur to confirm comprehension found that in the first 100 words, the proportions of object names, context bound object words, action words and personal names stabilised at around 60-100 words (40;15;27;18), but how each individual child got there showed considerable variation.

0;8 - 1;6: MacArthur checklist shows girls are ahead of boys in comprehension of the number of words, and that the overall pattern of development for girls and boys is similar. It grows slowly up to 1 yr, then there is a sudden increase in vocabulary size - the 'vocabulary spurt'.

Different theories attempt to account for the spurt.

i) Naming insight theory - children suddenly realise objects have a name (**Dunn, McShane**). Fails, as has already been seen, children understand some object names very early on.

ii) Spurt caused by a more general change in cognitive development. However, not all children show the spurt and the spurts in comprehension and production do not normally occur together.

iii) Connectionist model. **Plunkett & Marchman** developed a connectionist model that matched labels to images. The model's learning showed the typical spurt seen in children's vocabulary learning - slow progress for the first 20-30 words; then a dramatic increase in success. While there are significant differences in the way a computer vs a child learns, it does seem to indicate that it is the learning process itself that leads to the rate of increase in success. If this is so, then an additional ability is not required to account for the spurt, nor is it necessary to have two separate mechanisms to explain the spurts in comprehension and production.

Learning to say words

Development of 'babbling'

By 3m.o., babies make special sounds when interacting with others - cooing.

At 4m.o. they engage in vocal play - experiments with loudness and pitch.

At 6m.o. they start to produce recognisable syllables - made of a consonant sound and a vowel - e.g. da and ba - **Oller** calls this canonical babbling.

At 8m.o. they start to repeat the same sound - e.g. da-da - known as replicated babbling.

At 10m.o. they start variegated babbling (**Oller**) - one sound follows another - e.g. ba-da or da-de.

Vocal tract development

Babbling is given its characteristic sound due to the development of the infant vocal tract. Up to age 3m.o. it is closer to a chimp's - the tongue is large in relation

to the mouth, pharynx is short, allowing little room for the tongue to be manipulated.

Why is this so? - Up to 4m.o., the baby needs to suck to gain weight, so this is prioritised. After this point, the vocal tract gradually changes to a more adult-like form to allow the development of speech. The changes in the vocal tract are also accompanied by a change in the neural structure in the motor areas of the brain - together, these changes are the precursor for speech to develop.

Early word production

Early words are nearly always phonetic simplifications of adult speech - not until age 5-6 years that they can produce all the phonemes and their combinations required for a particular language.

Parents are good at reporting new words their children produce, even if they have more difficulty in reporting what they understand (see **Harris et al** study from earlier in the chapter). Words like 'nana' - for banana count as a word for the purposes of data collection as children often shorten/simplify longer ones.

MacArthur data shows children produce first words at around 10m.o. and as with comprehension there is a sudden increase at around 13m.o. Girls, on average, are significantly ahead of boys at this stage.

There is a significant correlation between production and comprehension - the greater the number of words a child produces the more they comprehend - 0.45 correlation after age removed. But accounts for only 20% of the variability - meaning there is a lot of independent variation in production and comprehension vocabulary sizes during development.

The MacArthur data shows there is a sub-group who have 150 words+ of comprehension but produce very few words. **Harris et al** also found a 3rd pattern in a longitudinal study of 6 children - those who only understand 1 or 2 words before saying their 1st word. Gap was only 1 month - more usual gap is 3months.

The meaning of children's first words

1980's view was that they were context-bound - produced in only one specific situation or context (**Barrett**). Although this is the case, there is extensive evidence that some early words are contextually flexible - **Bates et al** - as children used them in more than one context.

Harris et al found in a study of the first 10 words used by 4 different children, some were context-bound and others were contextually flexible. The same study found that some of the first 10 words were objects - evidence counter to the 'naming insight' theories of Dunn and McShane.

Data from **Goldfield & Reznick** supports **Harris et al** - 50% words used before the spurt were object names.

Harris et al found that children's first words resembled closely their mother's use of these same words. (data collected from parent's observations and researcher's observations of children and mother playing together in a laboratory setting every two weeks from 6m.o. to 2 y.o.)

Of the 40 words studied (10 each from 4 children), only 3 cases showed no apparent relationship between child's use and mother's use in the preceding month. For 33/40, child's use was identical to mother's use.

First word from one child was Mummy, but it was only used when he held a toy out for mummy to take. His mother had most commonly used the word when holding out her hand to take a toy saying 'Is that for Mummy?'

Note that the close relationship between children's words and mother's speech is limited to the first uses of first words. Subsequent uses of a new word show a much weaker relationship - **Barrett et al.**

Hart shows that direct experience is less important as children acquire new words. Compared early vocabulary with later vocabulary to see if there was a difference in the frequency of which words were heard at - found that this was the case. First words were used by parents on average 30 times in monthly observation sessions; later ones only used on average twice.

Some effects of experience do have an impact:

English learners acquire many object names but few verbs; **Gopnik & Choi** found verbs appear earlier and form a larger proportion of early vocabulary in Korean; **Tardif** found verbs = nouns in Mandarin Chinese at 21m.o - both these findings reflect the larger number of verbs mothers use with children in these languages - likely to be a result of the fundamental structures of these languages.

Harris et al: As expected, there is evidence that children with delayed language ability at 2 years have mothers who refer less often to the objects the child was attending to (around 50% of mothers). Also found that mothers who referred to objects using general names 'thing', 'one' rather than specific names 'ball', 'teddy' were more common in this group.

Reason is likely to be that it is the differences in maternal speech that is partly responsible for language delay (rather than children's responses). Study showed 16m.o. children producing similar speech, but at 24m.o. the differences appeared - therefore suggesting it was maternal speech style influencing development.

Individual differences in first words

Rate of development: MacArthur data shows children vary considerably in comprehension and production. E.g. at 16m.o. it ranges from 100-270 words for comprehension and 0-130 words for production. Means it is misleading or difficult to talk about the 'average child', but being able to spot language delay is important.

At 18m.o., lack of comprehension relative to norms and the non-production of canonical babbling indicate language delay problems.

Variations in vocabulary content: Most children have more object names in their early vocabulary. However, the proportion does vary. **Nelson** identified two styles - *expressive* and *referential*.

Referential style has a greater proportion of object names in their first 50 words; expressive have more action words and people's names.

Argued that the type of words produced is related to their overall rate of language development - **Bates et al** confirmed in a study. Referential (object names) style children build their vocabularies faster.

Using the MacArthur checklist, **Fenson et al** shows more complexity. In a 20-50 word vocabulary size (thus comparable with **Nelson's** research), proportion of object names varies from 12-100%. There is a link with vocabulary size and content - small vocabulary => object names < 24%. Larger vocabularies => object names >= 62%. The two most extreme groups therefore could be classed as having expressive and referential styles.

Closer analysis revealed that the more referential style were older children - not supporting the view that referential style children were more precocious in language development.

They also found that girls usually have more object names in their early vocabulary ... therefore, as they tend to produce words first, they may still be something in Nelson's theory - especially as the MacArthur data is cross-sectional rather than longitudinal.