BABBLING AND EARLY SPEECH:
THE CONTINUITY ISSUE

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Introduction.

The question of whether or not there is a connection between the period of babbling and the emergence of an adult-based phonological system in children is a controversial one. For many years the position of Roman Jakobson as laid out in his monumental work: *Kindersprache: Aphasie und allgemeine Lautgesetze (1941, translated as 'Child language, aphasia and phonological universals 1968)*: that the two periods were totally discontinuous, was accepted. In the following I examine Jakobson's claims and apply them to data from a 13 month-old child, following the methodology of Vihman et al (1985), whose detailed study provides support for continuity.

The first part of this paper outlines the 'discontinuity' position put forward by Jakobson. Having examined Jakobson's claim, I discuss arguments put forward by various advocates of the 'continuity' position against Jakobson. These include suggestions of possible explanations for Jakobson's adamant stand in the face of what now seems like strong evidence against the discontinuity hypothesis. I give a detailed account of the Vihman study, and discuss the methodology employed, including a discussion of what I consider to be problems associated with it. In the second part of the paper I analyse data from a 13 month-old child, to establish the extent to which it supports/contests Jakobson. I compare my findings with those of the Vihman study, and show that the evidence overall points towards continuity and away from the traditional Jakobsonian position.

Jakobson's account of the babbling period.

Jakobson writes in *Kindersprache* (1968), that before beginning to acquire language *per se*, children undergo a period of babbling which is characterised for many by *an astonishing quantity and diversity of sound productions* (1968:21). Echoing Grégoire (*L'apprentissage de la parole*), Jakobson writes that during this period, a child may produce articulations which *are never found within a single language or even a group of languages – consonants of any place of articulation, palatalized and rounded consonants, sibilants, affricates, clicks, complex vowels, dipthongs etc* (1968:21). He states that upon passing from the

pre-language into the language stage, almost all of this ability is lost: at this time both sounds which are not present in the language being learnt by the child and many of "those found both in the babbling and in the target language disappear.

According to Jakobson, it often requires considerable effort and several years of practice before the child re-acquires these sounds (in the case of palatal consonants, sibilants and liquids for example) although the child is still able to *perceive* these sounds:

> *The selection of sounds in the transmission from babbling to language can be accounted for solely by this transition itself ie by the newly acquired function of the sound as a speech sound, or, more accurately, by the phonemic value which it comes to have,...there arises and grows by degrees in children a desire for communication....The little beginner learns to recognize the identity of the sound phenomena which he produces, hears produced, remembers, and produces, first directly and only afterwards indirectly (metalalically). The child distinguishes it from the other phonological phenomena which he has heard, retained and repeated, and this distinction, which is felt as an intersubjective and constant value, strives toward a meaning.* (1968:24)

With this progression:
> *In place of the phonetic abundance of babbling, the phonemic poverty of the first linguistic stages appears, a kind of deflation which transforms the so-called 'wild sounds' of the babbling period into entities of linguistic value.* (1968:25)

Thus with the new development of a systematic relationship between sound and meaning, the child's sound system is drastically altered,

Jakobson maintains that, in marked contrast* to the ordered and hierarchical progression which occurs in the development of the language-system proper, there is no order of development during the babbling period, and the two periods are strictly discontinuous (27). They may even be divided by a short period of silence although on the whole the earlier stage *merges unobtrusively into the other, so that the acquisition of vocabulary and the disappearance of the prelanguage inventory occur concurrently* (29)• Therefore the criteria for distinguishing the sounds of babbling and the *pre-language residue* from those of 'permanent[1] ' speech sounds and embryo-words are the *persistence of the sound, the intention to express meaning by the formation in which it occurs, and the social*

setting of the utterance....(29). Thus the more developed the child becomes the more babbling is limited to periods of solitary play and of waking and going to sleep, and the social aspect of speech becomes paramount (29).

Opponents of the Discontinuity Position.

The 'discontinuity' view so forcefully expressed by Jakobson, and long accepted without question within theories of child language, is now being challenged by growing support for a position which claims a connection and continuity between the periods of babbling and speech. An indication of the extent of Jakobson's influence and of the respect commanded by his work, lies in the fact that for years textbooks and introductory courses in linguistics and psychology have faithfully repeated his view (Vihman et al 1985:397). However, whereas Jakobson's theory is now known to have been based on extremely limited data, and was in any case just a small aspect of his general linguistic theory, and not an explicit account of babbling *per se*, recently a number of empirical studies have shown increasing evidence in support of 'continuity', and a rejection of Jakobson's view.

In an assessment of the literature surrounding this disagreement, Vihman et al (1985) write that whereas certain recent accounts continue to support Jakobson (McNeill 1970, Bever 1961 etc), several studies using new data now exist which challenge the discontinuity hypothesis: they cite Cruttenden 1970 who finds when examining babbling during the transition period, that *the child's repertoire is shifted in the general direction of the language to be learned.* (Cited Vihman et al 1985:398) They mention that Oller et al 1976, Stark 1980 and de Boysson-Bardies et al 1980 indicate similar findings. To this list, Oller (1980:109) adds studies by Liebermann (1980), Menyuk (1968) and Vanvik (1971), which she claims have shown that *commonly-occurring phonetic types of the last half of the first year are quite similar to phonetic types of early meaningful speech.* Oller writes that babbling and speech may therefore be said to be related in important ways, indeed babbling probably reflects an emerging capacity for speech. She stresses that this does not necessarily mean that there is *no* discontinuity between the two stages, only that the similarities deserve attention (1980:109-10).

There is a certain amount of other literature also questioning or rejecting, either explicitly or implicitly, the discontinuity position. As an explanation for

the endurance of Jakobson's theory Liebermann writes in his study of vowel production in young children that the available data actually suggest that during the babbling stage the child is seeking to imitate the sounds of her linguistic environment, but is erroneously producing many sounds which do not in fact correspond to these. However a phonetician with experience of many languages might interpret the child's errors as being the sounds of other languages, since they may in fact seem to correspond more closely to the accoustic templates of the latter. Upon reaching the phonemic stage, the child starts to give contextual cues as to the target category of sounds, and it is thus easier to recognise her articulations as attempts at producing actual English (if she is learning English) sounds:

> *The hypothetical change in behaviour (Jakobson 1940) that is supposed to occur between the babbling and phonologic stage of language acquisition thus may be a consequence of a different frame of interpretation that the phonetician brings to bear on the question of classifying the child's speech sounds: (a) contextual cues are available to aid in the perception of speech; contextual cues play an important role in the classification of the sounds of adult speech in normal conversation........and (b) The child's phonetic ability also is constantly improving.* (Lieberman 1980:141)

Locke, another critic who rejects the discontinuity hypothesis, offers a different explanation for Jakobson's findings: he believes that Jakobson misunderstood Grégoire, whom he cited in *Kindersprache*, and who had written that the babbling infant *is capable of producing all conceivable sounds* (cited Locke 1980:194). Locke writes:

> *Somehow this was misconstrued to mean that his capacity, real or not, was randomly exercised. Since child speech is highly patterned, this logically encouraged the rejection of infant vocal play as linguistically irrelevant. Our claim is that babbling is importantly related to the child's acquisition of phonology; a categorical rejection of infant sound preferences would, ipso facto, disallow much of the child's early speech.* (Locke 1980:194)

Oller (1980:109-10) summarises the findings of Oller et al (1975) who analysed canonical babbling in ten children aged 6-13 months. Oller points out several similarities between early speech and babbling which she claim demonstrate that phonetic tendencies of early speech can be found in babbling. The study found that in both early speech and babbling, a) singleton consonants outnumber clusters, b) initial consonants outnumber final; c) initial stops outnumber

initial affricates and fricatives; d) initial unaspirated stops outnumber aspirated ones; e) glides outnumber liquids; f) apical consonants outnumber dorsal ones; g) final voiceless obstruents outnumber final voiced ones; and h) final fricatives outnumber final stops. She goes on to say that while the data indicate that babbling and speech are related in important ways, they do not necessarily demonstrate that there are no phonetic discontinuities between babbling and early speech. The problem with this article is that Oller lists those points on which the data showed similarities between early speech and babbling, without explicitly stating which or how many features were investigated or indeed which showed discontinuities. It is not therefore possible to get an overall impression of whether there was in fact more variation than similarity or *vice versa*.

Ferguson and Farwell (1975) also assume a 'pro-continuity' position, and provide a concise explanation of their rejection of Jakobson's theory on the basis of their study of *Words and sounds in early language acquisition*:

> *Our data, then seem to cast doubt on the Jakobsonian assumptions of (a) strict separation between phonetic and phonological development, and of (b) simultaneity in lexical and phonological parameters of the break between prelanguage and language.....In terms of contrasts determined by phonemic analysis, this account may be true. But in terms of the phonetic shapes of words and the selective acquisition of words, we have seen that a child's early words are often much more phonetically accurate than one would expect, and that these 'progressive' forms reveal processes of sound development which remain hidden if a strict separation of phonetic and phonemic development is assumed.* (1975:434)

Blount (1976) writes that *numerous investigators have suggested that babbling may provide the context for rudimentary, imitative behaviour through which some kind of learning may be accomplished* (Blount 1976:42). He claims that studies have shown that certain features of babbling are susceptible to vocal conditioning ie that some features of input language influence subsequent characteristics of babbling: in 6 month old Chinese babies, individual vowels include tonal variation whereas this feature is not present in English and American children. Blount also mentions the work of Liebermann (1967) who found that the fundamental frequency of infant's speech varies towards that of the adult with whom they are interacting, whereas that of crying is relatively unaffected.

Nakazima (1975), although she does not discuss whether babbling and early speech are phonetically related, writes:

> *Not only his mother's words and the talk of others, but also his own sounds stimulate the child to utter further sounds, just as in other circular reaction schemata.*
> *When an adult talks to an infant, imitating his babbling sounds, the child sometimes responds by uttering almost the same sounds. This might appear to be a kind of imitation of the adult's sounds; we believe, however, that the adult's sounds are, rather,simply a trigger that releases the infant's babbling schemata.* (1975:184)

Both Nakazima and Blount imply that babbling is wholly or partly characterised by both imitation of an adult interlocuter and attempts to approximate towards the sounds of the adult language. This position is implicitly anti-Jakobson and pro-continuity.

There have in fact been various investigations into the 'babbling drift hypothesis' (as outlined in Brown, 1958) which suggests that characteristics of the adult language are approximated as the child approaches meaningful speech. This position, if empirically supported would obviously contradict Jakobson. Thevenin et al (1985) could find no support for this hypothesis since their adult informants were unable to identify the language background of English and Spanish children whose babbling they heard significantly above chance level'). Oller and Eilers (1981) report phonetic similarities in the babbling of Spanish and English babies in spite of significant phonetic differences between the adult phonologies of the two languages. Neither Thenevin and Oller and Eilers therefore provide support for the babbling drift hypothesis: indeed both studies seem to produce findings more compatible with Jakobson's theory that babbling infants produce sounds which are not specific to the adult 'target' language. Neither study addresses the continuity issue directly by examining data containing examples of both babbling and speech from the same child(ren). This has, however, been undertaken by Vihman et al (1985).

The results of the above studies taken together in fact suggest an intermediate position: that babbling may be speech-like, but not language-specific ie might share the phonetic characteristics of language in general but not specifically those of the particular language to which the babbling infant is exposed. This position would be compatible with the notion of Universal Grammar, defined by

Chomsky as:

> a set of empirical hypotheses bearing on the biologically
> determined language faculty. The task of the child learning a
> language is to chose from among the grammars provided by the
> principles of universal grammar that grammar which is compatible
> with the limited and imperfect data presented to him. (Chomsky
> 1979:180)

From Babbling to Speech: A re-assessment of the continuity issue.

In this study, Vihman et al suggest that one possible reason why Jakobson's
position had never been fully and rigorously tested might be *that his
provocative but somewhat loose discussion leaves the way open for many possible
interpretations. In particular, he fails to provide clear guidelines for
distinguishing 'speech' from 'babble'.* (1985:399) Vihman quotes Jakobson's
criteria (quoted p2 above) for recognising the sounds of speech as opposed to
those of babble, but point out that the frequent or repeated use of a sound is
not enough to enable it to be classified as a speech-sound, *since, as Jakobson
specifically mentions, 'the child continually repeats [certain] sounds during the
babbling period'* (Vihman 1985:399 quoting Jakobson 1968:22).

In their extensive research project conducted at Stanford University the Vihman
project examined the phonetic characteristics of both babbling and early speech
in 9 children over a 7 month period beginning when each child was 9 months old.
One difficulty they encountered was that of distinguishing between word and non-
word during the transition period. Thus, they write, *Jakobson's 'intention to
express meaning' may be clearly present in some uses of a given sound shape, but
not in others. Social setting does not guarantee ease of definition either*
(1985:399). In Vihman's research, it was decided that the criteria for a word
should be an 'adult-based vocalization', all non-adult-vocalizations therefore
constituting non-words or 'babble'. The researchers are obviously aware of some
of the problematic aspects of these criteria, and hence are careful to justify
their decision in detail:

> *Since the distinction between words and 'mere babbling' is at the
> heart of our analysis, we now discuss at some length the principles
> used in making that distinction, some of the problems faced in
> following those principles, and the reasoning applied in resolving
> some of the problems. The main analytic dilemmas we encountered
> were the following: the occurrence as babble of shapes based on the
> phonetic form of an adult word; extensive homophony in the word
> and non-word vocalizations of a child with a highly limited*

*repertoire of sound shapes; and the inclusion of adult-based words
in strings of what was otherwise considered babble.* (1985:402)

They regard as a word *a conventionalized sound-meaning correspondence* (402)
which need not conform to the phonological system of the adult language, but
must be used by the adult with a consistent and conventional meaning. Hence they
regarded such sounds as 'yum', 'uh-oh' as words. They also allowed onomatopoeic
renditions of animal sounds, as long as these originated with the adults of a
family rather than with the child.

They included imitated as well as spontaneous child vocalizations as words, since
the aim was to compare ALL adult-based vocalizations with all other
vocalizations. Before a child was credited with the spontaneous use of a word
she was required to produce *a phonetic form that was a recognizable attempt at
the adult word, given frequent child-reduction rules....[using] the word
appropriately, with an apparently intentional meaning that was plausible in terms
of the adult meaning or use of the word and commonly occurring child-semantic
rules, such as over-extension of 'doggy' to cats and other animals.* (403)

Having identified a given phonetic shape as a spontaneously-produced word, the
classification 'word' was extended to other apparent instances of the same
vocalization, if they consisted of similar phonetic shapes and could not be
classed 'non-words' on other grounds. The justification behind this 'extension
convention' was that *in such a case, there is no way to rule out the possibility
that the child was THINKING about an appropriate context – or, for that matter,
recognizing, rehearsing, or simply savoring the sound shape itself – even though
there was nothing in her overt behaviour to reveal it, except for the verbal act.*
(403)[2] They justify this important step by pointing out that it in fact renders
the argument for continuity more difficult to prove, since it removes non-word-
like uses of highly word-like phonetic shapes from the 'babble' category, but
point out that it results in the inclusion of a small number of indeterminate
vocalizations (those fitting within the phonetic range of one of the child's
words, but used with no apparent context) being classed as words, although they
may in fact have been babble which happened to resemble one of the child's known
words.

A further consequence of the criteria used to distinguish words from non-words was that the communicative intention of the child was ignored in the case of vocalizations not based on adult-shapes: these were classed as non-words irrespective of their communicative function or any apparent systematic sound-meaning correspondence, Thus all meaningful non-adult-based utterances such as those described by Halllday (1975>[3] were classified as 'babble[1].

The final potentially problematic aspect of Vihman et al's definition which I shall deal with here is their decision to classify adult-based words, produced by the child within a string of otherwise babbled syllables, by including the whole string in the word category.

The study considered four categories of sounds in the speech and babbling of the 9 children. The unit compared across babble and speech was the *VOCALIZATION, based on breath group, timing, and presence or absence of a unifying intonation contour.* (402), Vocalizations were divided into words and non-words, and then counts were made of the distribution of syllable-length types, phonotactic structures and consonantal place and manner categories. Frequency distributions were established separately for word and non-word utterances, for the set of categories within each parameter. The categories investigated were as follows:

PARAXETERS   CATEGORIES

Vocalization length   monosyllable
in syllables   disyllable
                            polysyllable

Phonotactic structure   vowel (V)
                            consonant + vowel (CV)
                            (consonant*)vowel+consonant ((C)VC)

Consonant manner   glottal
                            stop
                            glide
                            fricative
                            resonant

Consonant place   labial
                            dental (/alveolar/palatal)
                            velar
          (see Table 1 Vihman 1985:408)

The researchers sought to establish whether the two variables (words and non-words) were similar within a given category:

> *If the two variables were highly dissimilar within a category, we would conclude that they were independent, and such independence would provide evidence for the discontinuity view; by contrast, within-category similarity between variables would indicate a dependent relation, and provide evidence for continuity.* (408)

In their analysis of phonotactics, the glottal segments [ʔ] and [h] are treated as non-consonants ('V' therefore includes ʔV, hV, Vʔ, Vh, ʔVʔ, etc) . In the consonant manner categories, fricatives and affricates are treated as 'fricatives'; nasals, liquids and trills are treated as 'resonants'. In the analysis of consonant place, only stops, fricatives, nasals and affricates are analysed because it is only in these classes that English contains segments which vary across all three places of articulation considered (ie across labial, dental [/alveolar/palatal] and velar).

The Vihman study found that, although the children showed differing sound preferences and consonantal-place preferences, both over time and compared to one another, they consistently exercised these preferences within both word and non-word categories. The syllabic structure of both words and non-words was also highly similar for all children: for both variables, the children demonstrated a preference for monosyllables and a low percentage of polysyllables. The phonotactic data, on the other hand, indicate a developmental trend: the mean percentage of both word and non-word vocalizations of shape V decline over the 7 months of the study, whereas the mean percentage of (C)VC shapes tends to rise in both types of vocalizations (For detailed results see Vihman 1985:425-32). Although certain categories show particular associations with either words or non-words (disyllables, CV structure, use of stops, resonants and labials with words; polysyllables, V structure, use of glottals and dentals with non-words), *the overall picture is one of continuity, with words and non-words exhibiting closely similar patterns, for any one subject, both at any given time and over time....in most cases the children can be seen to draw both word and non-word vocalizations from a single phonetic repertoire.*

The researchers conclude that there is strong evidence to support the notion of continuity rather than discontinuity between speech and babble. They write:

> *Jakobson's notion of an abrupt change from babbling to speech is based on a theory of linguistic structure which requires a sharp distinction between random phonetic variation (babble in Jakobson's terms) and tightly constrained phonemic production (words).*..By contrast, we see a far earlier growth of the 'desire for communication[9], the development which Jakobson appears to place at roughly the point of emergence of 'arbitrary sound distinctions aimed at meaning which require simple, clear and stable phonological oppositions'.* (440)

Vihman et al write that for all the children investigated, the beginnings of productive pairing of sound and meaning preceded the appearance of the first adult-based words, In the time in between, they note:

> *a gradual broadening of phonetic skills; the development of well-controlled sound patterns loosely based on the input language; and the use of certain patterns for the expression of rather broad, generally performative or affective meanings - as well as the acquisition of the first adult-based words. Ve interpret the continuity of this development as rooted in a dawning notion oi what language sounds like: a somewhat different notion for each child, as expressed in the differing favourite shapes, segments, and prosodies, There were shifts and changes in these over the transition period, but they did not tend to divide words and non-words; they could and did occur within either category, and typically in both.* (440)

They conclude, therefore, that the long-accepted division between babbling and speech appears to reflect the way adults perceive and interpret child language development, rather than actual developmental processes displayed by the child. This conclusion represents a rejection of Jakobson's discontinuity hypothesis *per sae,* and clear support for the continuity position

The remainder of this paper will be concerned with presenting and analysing the results of my own investigation.

Xethodology

From data collected for a large-scale detailed longitudinal research project, to investigate the speech of a child who is being brought up bi-lingually in English and Spanish, sufficient data (from three audio-video recordings made within a period of 24 days when the child was approximately 13 months old) was transcribed to make the following synchronic description. The child (M) is recorded on video and audio tapes, playing in her own home in the company of her Grandmother (G), who speaks to her in English, The data thus consist primarily

of dialogue between M and G, and include some participation of the researcher (R). The child's utterances are transcribed in broad phonetics. The utterances of G and R are transcribed orthographically, to provide the exact context for the child's utterances, in order that each child vocalization[4] may be classified as either 'speech' or 'babble'.

242 vocalizations were transcribed in all: these were classified as speech or babble according to the criteria adopted in the Vihman study (see above) with modifications appropriate for the study of a child being brought up bi-lingually eg in order for a vocalization to be classed as a word it had to be based on the corresponding adult form in either English or Spanish[5]. In spite of certain reservations outlined above, I have adhered to Vihman's guidelines for the sake of comparability and because they provide a fairly unambiguous and clearly-defined way of allocating vocalizations to the categories of either speech or babble, but one suspects that for example the extension principle (see above) may result in some distortion of the results: for example, following Vihman, having decided that [M̩] (meaning 'animal' or 'soft toy', and originally from 'moo' the sound made by a cow) was to be classed as a word, all other occurrences of [M̩] are also counted as words, whether or not they seemed to from the context to refer to an animal or soft toy. (Incidentally, this was M's first 'word'. It was also one of the most difficult classifications to make: finally, since it was a consistently-used sound-meaning correspondence, and following Vihman who had classed as 'words' onomatopoeic renditions of animal noises if they were family-specific and originated with the adults, it was classed as a 'word'.)

Given the possible distortion of results caused by the factors outlined above, and bearing in mind that in some cases the quality of the video and audio recordings was poor, and my inexperience in phonetic transcription, I do not wish to make claims to a high degree of accuracy in transcription. This fact, together with the consideration that in many cases, the figures involved are too small to be taken as a serious indication of anything more than a tentative pattern should be borne in mind when studying the results below. Except where otherwise mentioned, I have adhered to Vihman's methodology in the transcription, classification and analysis of the data.

Results

The statistical analysis of the results below used a computerised statistics programme, incorporating a test similar to the Chi-Squared test but especially designed to be suitable for use in cases where some categories contain very small figures. In all categories the results show differences between words and babble which are significant at 1%. In the consonantal manner category, two rows contain small expected frequencies which might invalidate the Chi-Squared test. However, repeating the analysis without these two rows shows that the results remain significant.

1. <u>Vocalization length in syllables.</u>

Length in syllables of vocalization	Words no.	%	Babble no.	%
Monosyllables	101	90.2	93	71.5
Disyllables	9	8.0	24	18.5
Polysyllables	2	1.8	13	10.0
Total vocalizations	130	100	188	100

CHI-SQUARE	D.F.	SIGNIFICANCE	MIN E.F.	CELLS WITH E.F.<5
13.95310	2	0.0009	6.942	NONE

Unlike Vihman's analysis which showed a significant association between disyllables and words; and polysyllables and non-words, M's data show that by far the majority of her vocalizations are monosyllabic at this stage. It should be remembered that Vihman's subjects were studied over a period of seven months, at the end of which they would be approximately 16 months old, thus it is not surprising that their data display proportionately more di- and polysyllabic vocalizations.

No of Vocalizations
(percent)

Length of Vocalization
(in syllables)

FIG 2 - PHONOTACTIC STRUCTURE

Number of
Vocalizations
(percent)
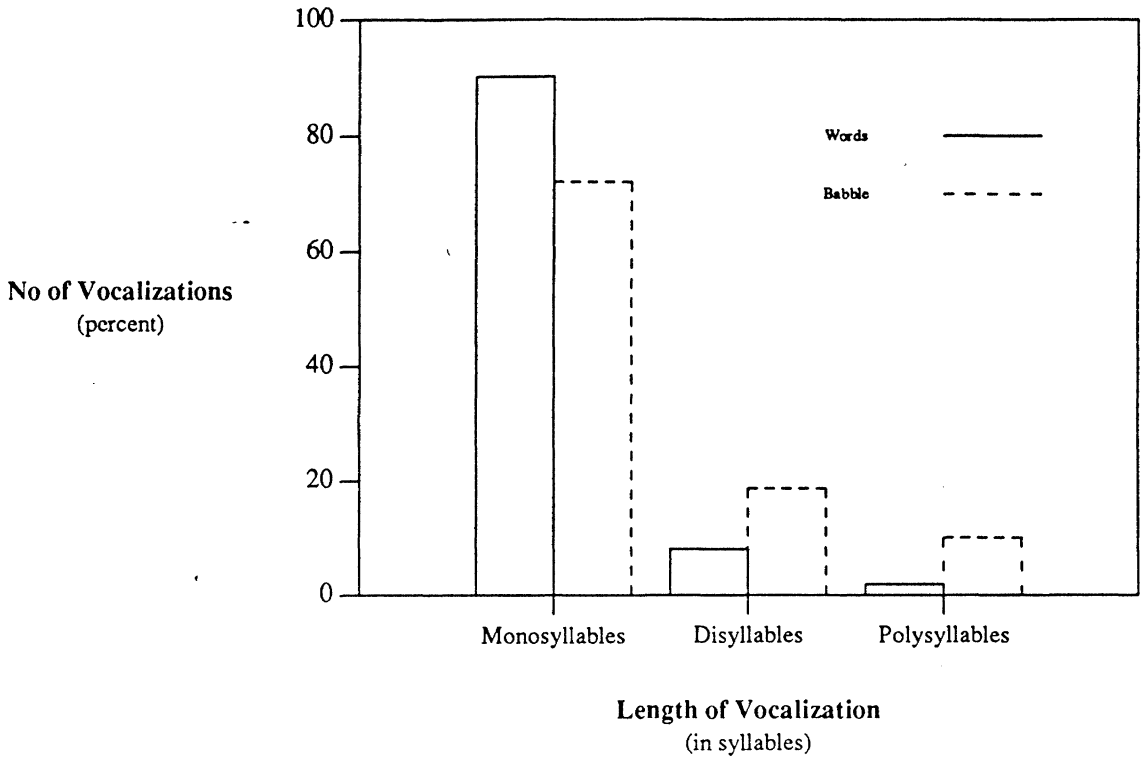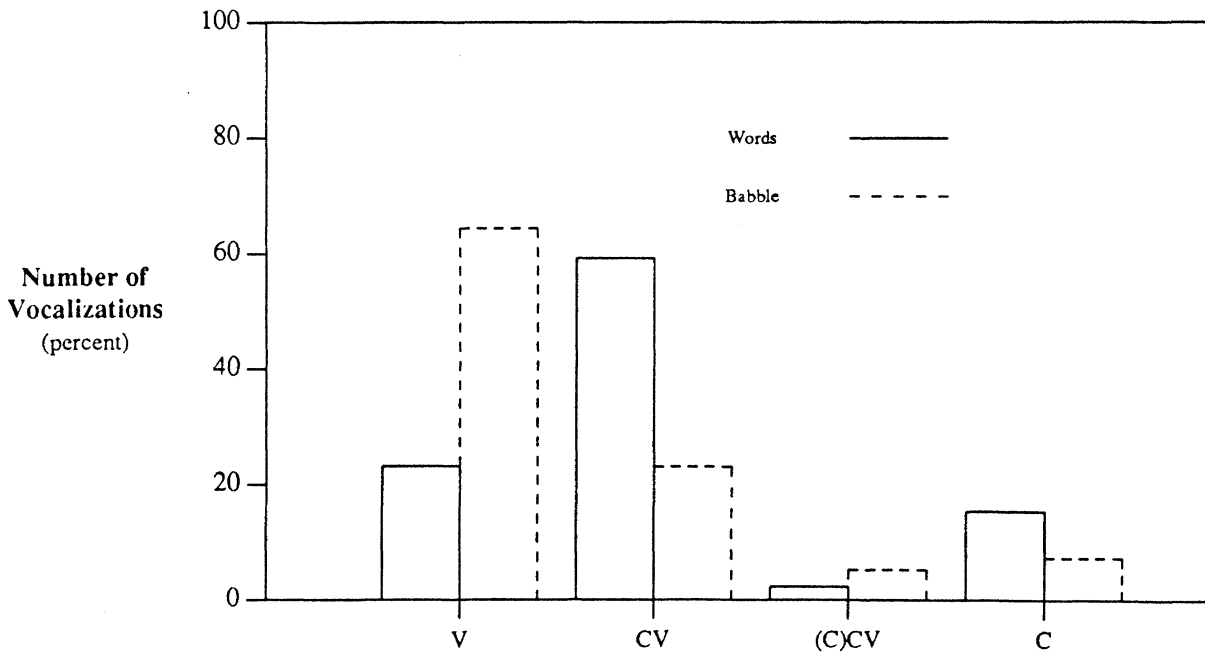
2. Phonotactics

Phonotactic structure	Words no,	%	Babble no.	%
•V	30	23.1	121	64.4
'CV	77	59.2	43	22.9
•(C)VC'	3	2.3	10	5.3
•C[1]	20	15.4	14	7.4
Total syllables	130	100	188	100

CHI-SQUARE	D.F.	SIGNIFICANCE	MIN E.F.	CELLS WITH E.F.<5
60.74457	3	0,0000	5.314	NONE

In addition to the phonotactic patterns employed by Vihman, I introduce the category 'C to accommodate the syllabic nasals [M̩] and C *y̩ 1. Vihman found a significant association between CV and words; and V and non-words (432-3) and this is confirmed in the figures above. Vihman's phonotactic data suggested a developmental trend of both words and non-words away from V and towards CV, which obviously is not shown in this synchronic description.
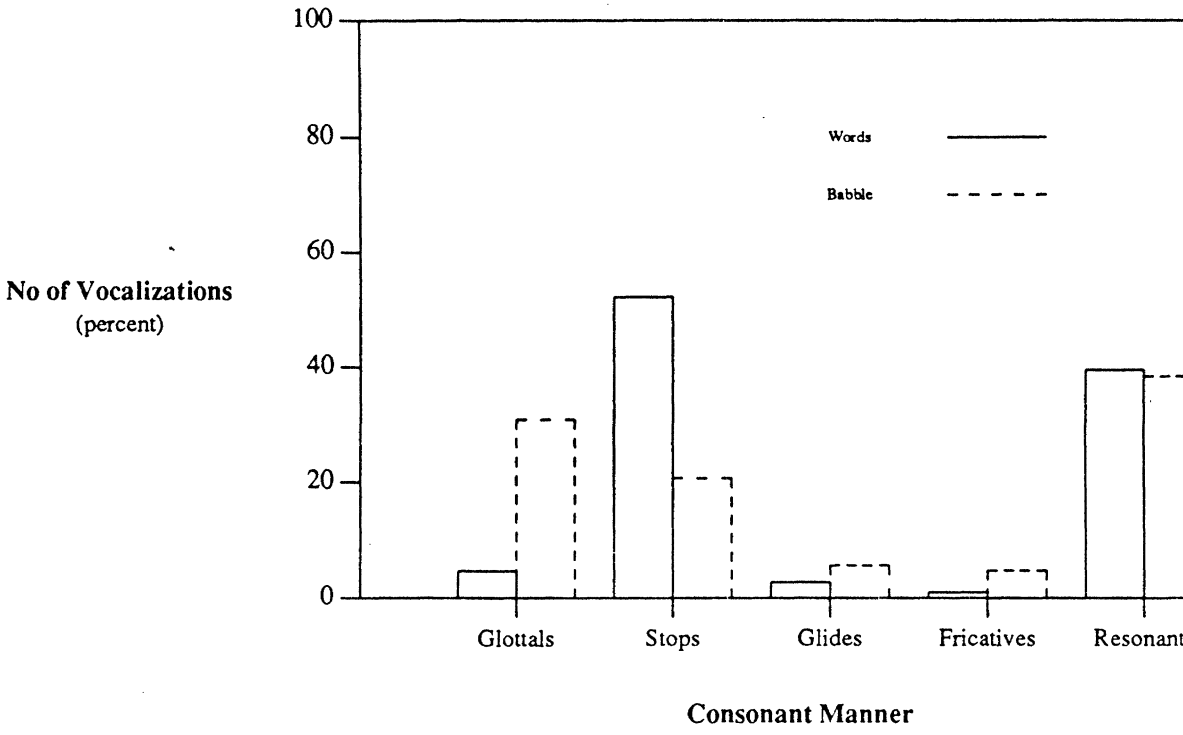
3. Consonant manner

Consonant manner	Words no.	%	Babble no.	%
Glottals (ʔ,h)	5	4.6	33	30.8
Stops (p,b,d,k,g)	57	52.3	22	20,6
Glides	3	2.8	6	5.6
Fricatives (tʃ,f,ʃ,ç)	1	0.9	5	4.7
Resonants (m,n,ŋ,ɲ,l,r)	43	39,4	41	38.3
Total consonants	109	100	107	100

CHI-SQUARED	D.F,	SIGNIFICANCE	MIN E.F.	CELLS WITH E.FX5
39.83709	4	0.0000	2.972	4 OF 10 (40%.)

Vihman et al report significant associations of stops and resonants and words; and glottals and non-words. In M's data stops are certainly associated with words, and glottals with non-words, although resonants appear to divide almost equally between the two groups. (Following Vihman, fricatives and affricates were collapsed into the 'fricative[1] category and nasals and liquids into that of 'resonants[1]. I found their inclusion of 'glottals[1] as a category of consonant confusing since in the phonotactic analysis both Ch] and [?3 were counted as non-consonants, however, I have followed their criteria in order that the results should be comparable.) The transcription of initial stops was problematic as their identification as either the voiced or unvoiced forms (ie as /p/ or /b/, /t/ or /d/, /k/ or /g/) was impressionistic and rather arbitrary. Eventually, since this study is not primarily concerned with stop consonants, I opted for consistency within individual 'words[1], (so, for example, the list of alternatives within a word such as 'ball[1] is transcribed as C bo:], [bo:h, C b⊃], [D:], CD 3, following the initial English /b/, although the child could just have well been

FIG 3 - CONSONANT MANNER

No of Vocalizations
(percent)

Words ———
Babble – – – –

Glottals   Stops   Glides   Fricatives   Resonant

Consonant Manner

FIG 4 - CONSONANT PLACE

No of Vocalizations
(percent)

Words ———
Babble – – – –

Labial   Dental   Velar
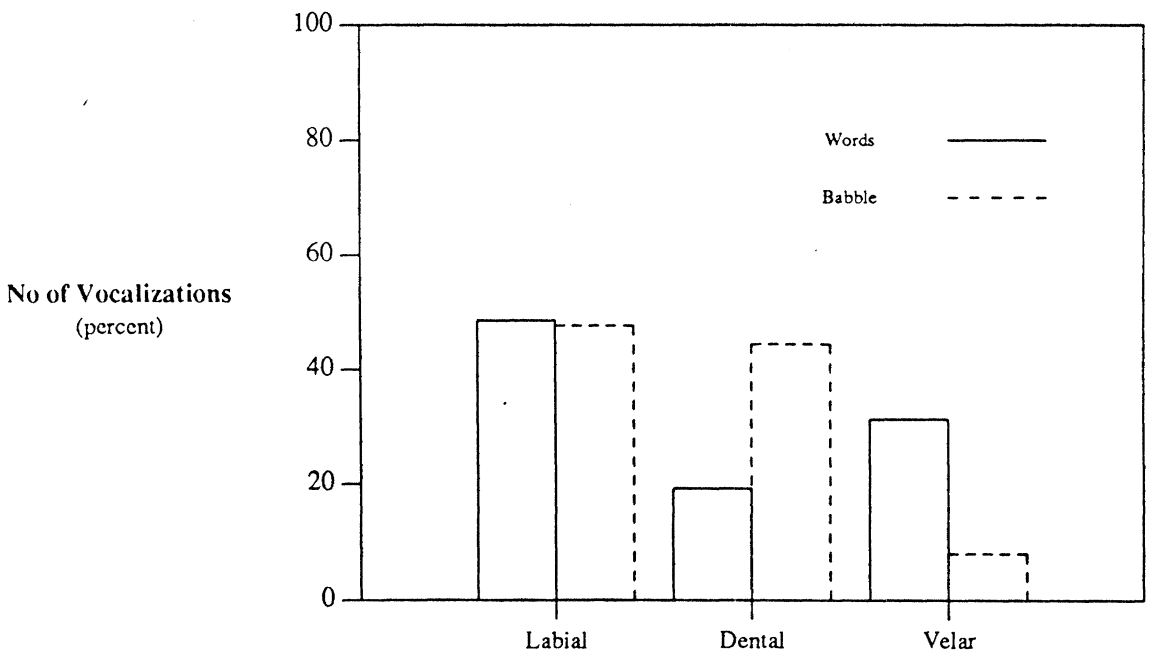
producing a Spanish /p/. However, although obviously in need of mention, this fact does not affect the results in either 3. or 4.

4. <u>Consonant place.</u>

Consonant place	Words		Babble	
	no.	%	no.	%
Labial (p,b,m,f)	48	48.5	30	47.6
Dental (/alveolar/ palatal) (t,d,n,ʃ,ɲ,ç,j,tʃ)	19	19.2	28	44.4
Velar (k,g,ŋ)	32	32.3	5	7.9
Total consonants	99	100	63	100

CHI-SQUARED	D.F.	SIGNIFICANCE	MIN E.F.	CELLS WITH E.F.<5
18.49320	2	0.0001	14.389	NONE

Vihman report significant association of labials and words; and dentals and non-words. M's data do not contradict this, but show a high proportion of labials in non-words also: almost half the consonants in both word and non-word categories were labials.

The results for all categories showed differences between words and non-words significant at 1%. Although at first glance this would appear to support the case for discontinuity, the matter is in fact more complex than this. Figures 1 to 4 show that whilst there may be significant differences between words and non-words within all parameters, there are also interesting similarities between them within certain categories. Furthermore, it is worth considering the fact that all categories within all four parameters contain examples of both words and non-words. This fact alone suggests that there is in fact considerable phonetic similarity between them, and provides some support for the 'continuity' position.

Conclusions
It would be absurd and I do not intend to claim that such a small-scale and inexpertly-conducted study as this could challenge a theory such as Jakobson's.

The only appropriate conclusions which can be drawn are that the above results seem to be compatible with those of the Vihman study, and in many cases with Oller (1980) (although lack of specific results in her study makes comparison difficult). Oller concludes that there are important phonetic connections between babbling and speech, but that one would not assume from this that there were no phonetic discontinuities. Vihman et al conclude that the whole relationship between babbling and speech is far stronger and more complex than has previously been believed.

I believe that the evidence available, including that from my own investigation, suggests that, while there are no grounds for such an extreme position as the statement, for example, that the phonetic structures of speech and babbling are *identical*, and that therefore Jakobson should be dismissed out-of-hand, there are however considerable similarities between 'speech' and 'pre-speech', and in fact maybe the whole traditional 'speech-babble' distinction should be re-thought. I believe that support for this view is in part provided by the fact that it was so difficult for Vihman et al to arrive at a satisfactory distinction on which to base their criteria for assigning vocalizations to the 'word' or 'non-word' categories (although here one is in danger of entering a circle of tautological definitions).

Finally, I agree with Vihman et al that within the existing definitions, the evidence seems to point towards continuity between 'speech' and 'babble' and away from the traditional Jakobsonian discontinuity stance.

Acknowledgement

fotes.

1. This would not, presumably, preclude the possible existence of fine
   phonetic differences not discernable to the un-trained ear,

2. For an interesting discussion of this phenomenon see Ruth Weir's
   Language in the Crib, 1962: the author analyses the pre-sleep
   monologues of her two-and-a-half-year-old son in which he appears
   be experimenting with words and sounds, practising and comparing
   morphologic and sytactic patterns and substituting these with *othi*
   items from his vocabulary,

3. See for example p12-16 : Halliday identifies systematically-used
   non-adult based sound-meaning correspondences, which he calls
   'content-expression pairs',

4. ie the unit of analysis chosen following Vihman et al see p402

5. As a non-speaker of Spanish, where I was unsure as to whether M's
   consistently-used sound-meaning correspondences, originated from
   a Spanish word, I consulted a Lexicon which lists all M's words,
   alternative phonetic renderings, the source-word (in either Englis]
   or Spanish), and the date of the first appearance in M's speech.

6. Since it is only within these classes that English contains segmen
   which vary across all 3 of the places of articulation considered,
   Although this study is considering the vocalizations of a child wh
   is in the process of becoming bilingual in English and Spanish, I
   have decided to observe this procedure, to facilitate comparison.

Appendices

<u>Key to transcription conventions.</u>

Diacritics   Pitch

  ₀ voiceless d̥   ‾ high level   . short pause (less than
  .. breathy-voiced a̤   _ low level   1 second) .
  . syllabic ṇ   ʼ high rising
  ₊ advanced u̟   、 low rising   .. long pause (more than
  _ retracted i̠   ` high falling   1 second)
  ¨ centralized ë   ＼ low falling
  ~ nasalized ã̃   ^ rise-fall   } simultaneous speech
  : long   a: ⌄ fall-rise
                                                ' syllable boundary

Appendix 1

23:10:86

```
0000  M:  [ _a: .. ‚ə: ]
      G:  You don't need all these carrier bags, I'll put them under your er,
          what's the name, shall I? (putting bags away)
          (M walks over to box with panda, drops panda, reaches into box and,
          when she can't get what she wants, shreiks:)
0001  M:  [ ‚a: .. ^a:u: ]
0002  G:  What? There we are. What are we going to play with? I'll leave those
          there for the moment....
      M:  [ `u: ] (trying to reach into box)
      G:  ....or keep....we might want the pets, mightn't we?
      M:  [‚u: ə: a: ] (still trying to reach into box)⎫
      R:  Well, you can play with anything you like.          ⎬
0003  G:  Oh, what's in here? (reaching into box)             ⎭
          Oh, what's this, Manuela? (brings out a shoe)
      M:  (studying it intently) [                    ]
0004 ·G:  Horrid old boat, isn't it? (laughing) Mummy's shoe.
          (pulls football out of box) Were your shoes alright?
      R:  Sorry?
      G:  From the cobbler. Were you pleased with the cobbler?
0005  R:  No, because nobody's picked  them up yet. Sergio went but it was
          closed. (laughing)
      G:  (laughing)Ah.
          (to M) What's this? (holds out her arms for M to throw ball)
0006      (M throws ball to G)
          She's very thoughtful. She's just thinking. She knows that this game
          is up, doesn't she?⎬
      R:  What's going on?  ⎭
          (M picks up ball)
      G:  That's right. That's Manuela's.... ball, isn't it.
0007      (M drops ball)
0008  M:  [ _ə'hə'hə]
      G:  That's right. Fetch the ball. (holds out hands)
      R:  This photograph might be good. (hands photo to G)
      G:  Yes, or let me show you this new one that I brought.
0009      Who's this, Manuela? (gets up and fetches photo from table)
          Who's that? (showing photo to M)
```

```
0010         Who's that little girl? (points to photo)  Is it Manuela?
             And.,...(pointing)...Grandpa
             Manuela*s screwing her face up in the sun.
             Oh yes.
0011   R:    The date today is Thursday October 22nd, isn't it?
       G:    Um, no 23rd.
       R:    22nd, I think!
0012   G:    23rd, I think!
       R:    Veil, I shall look in my diary.
       G:    24th tomorrow is her, um, birthday.
       R:    You're quite right, 23rd.
             (M looks in box)
0013   G;    What's in here?
       M:    (standing back) [ - *,* ]
       G:    Mm? Shall we get them out?
             What's in here? A book? (getting out a book and handing it to
0014   M:    (looking in box) C " ry\ ]
       G:    Have to turn it on it's side, shan't we?
             (turning box over) There we are now, Manuela can get them out.
             Who's that? (showing M picture)
             Who's that?
0015         (M ignoring her reaches into box)
             (M pulls out ball)
       G:    Oh, that's a nice one!
0016         (M gives ball to G)
             (G tosses ball in air)
       G:    Bally!
0017   M;    (reaches out picture of car and hands it to G) [-k$i:]
       G:    Car! Yes!
0018         And....is the sound on? (R comes back into room)
       R:    Yes.
       G:    We've just had a good 'car'.
       R:    Oh! Where was the car picture?
0019   G:    Show Mummy, which was the car, Manuela?
       R;    This one?
       G;    Yes, she picked it up and handed it to me and said 'car*.
       R;    Yes, I think that's probably the best way of doing this.
       M:    (hands picture to G) I ^ : ¹ } ' w e ]
0020   G:    What's that? (mimes) /h/
       R:    What is it?
       G:    A house? Ah, and that's....
             (X picks up book and walks over to R with it)
0021   M:    [^n a:u.. `a ma]
       R:    You want to show me?
             What is this? (taking it)
       M:    (walking along shaking her head) [ ^ wa ]
       R:    Look, Manuela!
             Manuela, come here, please, show Granny,
0022   G:    What is this, Manuela?
       R:    What's this?
             (M turns round and walks towards her)
             What is it? What is it? (whispers)
       M:    [`i .¯nam.¯ma.¯na..n]
             (R and G laugh)
```

0023	R:	And what's this? (showing M a picture in a book)
		(M bends down to look in box)
	G:	What's in there, at the back there?
0024		What's in there, Manuela?
		(M gets right down to look until she is almost crawling into box)
		(M brings out picture)
		Ooh! Aah! Who's that?
	M:	(shows 2 pictures to R) [ˉɱ ˋˎɱə]
0025	G:	That's....
		(M bends down)
	M:	[ˎɝ] (frustrated)
	R:	What's that?
	M:	[ˊə: ' ˎə:]
0026	G:	Ball?
	M:	[ˎə:]
	R:	The car
		Interesting the way she picks this out of the whole thing.... (points to car in picture)
0027	G:	The cars are very important for her.
	M:	[ˋŋ]
	R:	Part of her everyday.
	M:	[ˎkɑ:]
	R:	Which one's a car?
		(M points to picture of car)
	M:	[ˉəˎ'əˎ'ə] (laughing)
	R:	That one. Right!
	G:	Who's that? (pointing to another picture)
0028		Who's that, Manuela?
	M:	[ˋʌ:. ˋŋ̣] (walking away, shaking head)
0029	M:	[ˉɱ]
	R:	(walking over to M) Who's that?
	R:	/m/ Did you see Mum? Where was Mum?
0030	G:	Yes, look: she's talking about seeing. Is it Granny? Gran?
	M:	[ˎɳ̣]
	R:	Who's that? (laughs)
0031		Right, we might have a pause
	M:	(yells) [ˎwæ:]
	R:	I think, yes, we're going to have a pause. Alright.
	M:	[ˎwæ:] (shouts) (bringing overall to G)
	G:	What's this?

Pause.

0032	G:	Who is it? (M showing picture to G)
	R:	Right.
	G:	Grandpa. (looking at picture)
	R:	Now we'll switch to the radio mike.
	G:	Who's that?
0033	M:	(pointing) [ˎɝ]
	G:	Grandpa....
		(M slips over and starts to cry)
0041	R:	Oh, look!
	M:	[ʌnɔ. ˋɳɔ. ˉɳɔ. ˎɳɔ] (bends down and picks up another picture)
0042	G:	What's that? Who's that?

M: [�⌒ɝ] (holding out picture to G)
G: (taking it) Oh, thank you
M: (holding it up to R) [�⌒ə ˈhə ˈhə . m̩]
0043 G: Give it to Mummy then.
R: What is it? Mm? (comes and sits down)
     (M gives her picture)
M: [�⌒əˈ ˈ2ə]
R: (taking it) What is it? Is it a car?
M: [⌒ɔ:]
     [⌒m̩]
0044 R: Oh there's a ball.
     (G holds out arms. M throws ball)
G: Ooh!
0045 R: She looks rather good in that little dress.
G: Yes, she does, doesn't she: sweet! (laughing)
     (G throws ball back to M)
     (M throws ball again)
0046 G: Here comes the .....?
0047 M: [˙ʔəˈʔəˈʔə . ⌒ɝ:] (throws ball)
0048 G: Here comes Manuela's.....ball!
M: [˿ʔə'˿ʔə '˿ʔə'˿ʔə . ⌒ɝ:]
G: What's that?
R: Take it to Granny.
0049 G: Box? The box?
M: [ˍ3:]
0050 R: Take it to Granny. To Granny. Go and see what's in that box there.
     (G bends over towards box)
G: What else is there in here?
     Ooh! What's this Manuela? (points in box)
0051   (M wanders over and looks in box)
M: (picks up watch) [ˍ3 . ˍ3:] (hands it to G)
G: (taking it) What is it?
0052 M: [⌒3:]
     (G puts it to her ear)
R: (laughs) That's what watches don't do nowadays, isn't it?
     What is it? What is it?
0053 M: [⌒ɝ̃:]
R: What is it? Is it like Mummy's watch that goes here? What is it? Mm
M: [⌒3:]
0054 R: Take it back to Granny?
     (M gives it to G)
G: (taking watch) Watch?
0055   What does it say? What does the watch say?
M: [ˍə: ⌐æ] (taking it to R)
     [⌒3:]
0056 R What does the watch say? What does the watch say?
     Nothing, I should think
M: [⌒ɝ̃: . ^3:]
G: No, I wasn't sure whether she'd met a clock that says tick tock.
     No, it is a bit confusing now, isn't it?
0057 R: Mm
M: (walks to G and gives her watch) [ˍdʌ' ˍʔʌ]
0058 G: Thank you.
     It's a.....?

- 27 -

```
     M:  (taking it away) C .. S    3
     G:  What did you say she calls it?
     R:  She just says /ga/. It's one of her few words: /ga/,/ba/.
0059 M:  (shouts) C - g * : ]
     R:  That's right.
     M:  [ - g æ : ]
     R:  And what's this, a dog?
     M:  C -bak ]
0060 R:  That's what you said, that should be a /ga/ shouldn't it.
         Which I think she must have got by looking at...by hearing 'clock',
         I don't know...
     G:  Yes, she might have done.
     R;  She spent one entire meal at the university pointing to the clock
         the wall and saying /ga/.
0061 G;  Did she? Oh, and that was an ordinary,..
     R:  Clock on the wall, yes but she does it with my watch...").
     K:  [ - ʒ :   ʒ ]
     R:  And with this picture that she saw in a magazine,
     G;  Yes, I see,
0062     Ooh! (to M)
     M:  C ,KA \ a 3 (handing G the watch)
         [ _ r    3
     G:  Clock?
     R:  I know what else we've got here. What's this?
0063     (R brings over giant toy panda)
         (X stretches out arms to it)
     G:  Aah!
     R:  Word for this?
     H:  [ ˅ d ɑ : ]
     R:  That's not a /da/ usually!
         You changed it's name have you?
0064     Panda!
     G:  Is it a panda, Manuela?
         (X climbing on panda)
0065 R:  There you are,,..
     G:  There, you're sitting in panda. And....
     R:  (bringing over another smaller panda) Baby panda.
     G:  One of those photos that goes on and on and on!
     R:  Yes (laughing)
     G:  (laughing) Panda!
0066 M:  (drops little panda) I ' ¥' •  3
         (picks up photo) [ s ^ :  3
     R:  Who are those people?
     K:  [_M  ' 2A  ]
     R:  Who are they? Who's that? (pointing)
0067 X:  C ,**   3
     R:  Is that grandpa? (pointing)
         Which is Grandpa?
         Is it Grandpa?
0068 M:  C - A    3 (pointing to photo)
     R:  That's,...Mummy.
         She's looking at me, comparing me with the photo.
     M:  [  ^ 3 :   3 (pointing)
0069 R:  And who's that?
```

	Who's that funny face? Look at her with glasses.
M:	[ˏ‑ə:]
R:	Granny!
0070	And who's this? Who's this?
	Well, or another one, a more recent one. (picks up another pho
	Who's this?
	(M takes picture)
0071	She was talking about him this morning.
G:	Was she?
R:	Who's this? Who's this?
0072	Mm? Who is it?
	(M sits on large panda, not interested)
	Who is it?
	(M puts photo in front of her face)
0073	(to G) I've decided not to tell!
G:	(laughs in agreement) Yes, I think she wants to know.
M:	[ˏbɪ.. ‑3] (giving picture to G)
G:	Thank you.
0074 R:	She realises she's got a big weapon here.
M:	[‑ʌ'2ʌ '2ʌ '2ʌ] (lying on panda with picture)
	[ˏ‑h3.ˏh3]
R:	Have you tried this one? (hands G picture of duck)
0075 G:	Oh yes.
M:	(points to picture) [ˏdɑ]
G:	Ooh, /da/ duck!
R:	Aah!

Continued on next video

0000 G:	I like to see the ducks.
M:	[ˏwuɛ:] (shreiks)
0001 R:	Give it to Granny. Granny look after it for Mummy.
0002 G:	Can I have it, Manuela, please?
0003	Thank you, thank you, darling. (takes object)
	(shows M book)
0004	Look, d'you remember the ducks?
0005	What do the ducks say?
0006	We saw the ducks, didn't we? (points to book)
0008	And the....cows. The cow says...
0010 M:	[ˏnou]
0011 G	No no (laughing) She's not going to cooperate.
0013	And the dog says...
0014 M:	[ˏbə̈'ˏwə̈]
G:	That's right. The dog says /bʌ'wʌ/
M:	[hə̈'hə̈]
0015 G:	Yes, that's the sheep. The lamb says...do you remember what th
	lamb says?
0017 M:	[ˏbam]
G:	/bam/!
M:	[ˎm] (takes something to R)
R:	What's that?
G:	Pan...panda (holding book)
R:	What's that?
0019 M:	[ˏbɑ]

```
0020  R:  Mm, panda isn't it?
0021  G:  Can I see panda?
0022  M:   E.wv '• uv V uV : 3 (giving something to R)
0023  R:  Thank you, What is it?
0024      What is it? Vhat is it?
0025      Give it to Granny
0026  G:  Come and see pandas again, (holding book)
0027      Like this panda isn't it? (indicating large toy panda)
0028  R:  It's bigger than you.
      G;  Yes, (laughing)
0029      (reaches for smaller panda) Where's the other one?
0030  M:  [-jv*._n3-- 0 3 . ^ jv 9  ] (shaking head)
0031      (picks up shoe)
0034      l,¥: ' ' ? : 1
0035  G:  A shoe? (M gives shoe to G)
0036      Vhat a horrible shoe! Is it one of Mummy's shoes or Daddy's shoe
0037      Is that Daddy's? (giving shoe to M)
      M:  (takes shoe) [^3^-` ]
0038  R;  Give it to me,
0039  M:  (takes shoe over to R) t^^'. 1
0040  R:  Put it on my feet, See if it fits,
          (M holds out shoe)
      M:  [-Y  1
```

End of tape.

                                                        30:10:86
```
0000  M:  [ʏʹhʏ
      R:  Oh, it's the panda, Aah!
0001  M:  [-*i3T] (appears with panda)
      G:  Man? Is that Manuela again?
      R:  Would you like to look in the box and see what there is there?
0002  M:  lJ% 3
      G:  What's in here? (pointing in box)
      M:
0003  G:  Shall we tip them out, Manuela? Thank you: I'll take the panda th
0004      (takes panda and tips toys out)
0005      Are you going to take them out? What's there? What's this?
0007  M:  [-2V1 (looks in box)
      G:  Are you going to take them out?
0008  M:  U Ҷ 3
      G:  (imitating M) / v ' is' is/ What shall we take out?
0009      [.ʉ] (G lifts out shoe)
          [.y 1 (G laughs)
0010  G:  Oohf
      M:  [.kəʹwə]
0011  G;  What's that? Thank you! (M lifts toys out of box and gives them
0012      (M coughs) Shall we look at the pictures?
      M:  t-V 3 (looking with interest at book)
0013  G:  Aah!
0015  X:
      G:  /g a / (imitating M)
0016  R   (voice only) What's that?...What is.,.?
```

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	G:	Clock? (showing M picture of clock)
0017		This is...
	M:	[⌃u:]
	G:	Go and show it to Mummy!
0018	R:	What's that? (M takes pictures to R)
	M:	[⌣gɑ̈]
0019	R:	/gɑ / Oh yes, it's pictures of watches, clocks. Lovely! Take it back to
		Granny.
0020	M:	[⌵ɔ̃:]
0021	R:	Can you give it to Granny?
	G:	Where is the watch? (looking in the box)
	R:	Granny's got some more pictures.
0022	G:	What have we got here, Manuela? Who's this?
		(M brings books back to her)
0025	M:	[⌃m̥] (giving book)
	G:	Oh, thank you. (taking book)
		Who's that? (showing M a picture)
0026	M:	[⌣m̥ ɑ] (takes picture)
	R:	Who's that?
	M:	[-m ʌ̈]
	R:	/ mʌ / Who is it ? Mm?
0028	M:	[⌿mæ:]
	R:	That's Mummy's book. Who's this?
	M:	[-ə 'ə' ŋ̩]
	R:	Don't you know? (laughing)
	M:	[-nə]
	G:	No (laughing)
0029	M:	[⌵nə] (bending down and looking in box) [⌵gʊo . ⌵gu]
	G:	Go! (pointing at box)
	R:	Go, the box is empty.
0030	G:	Yes, gone, all gone. (tipping box to show M)
0032		Has it finished? Is it gone? (M sneezes)
0033		Oh dear!
0035		(M stands up and gives shoes to G)
	M:	[⌵ʊ]
0036	G:	Is that shoe? Mummy's shoe? Is it a shoe?
0037	M:	[-ʊ'⌿wæ 'wə] (squark) (takes shoe away)
0038	R	What's this? Mm? You got my shoe? Funny old shoe, isn't it? Go back
		to Granny. She doesn't like it.(to G)
0039	G:	No, well, Granny doesn't like it. No.
0040	G:	Granny doesn't like it! (laughing)
	R:	Granny doesn't like it! (laughing)
	M:	[-l æ]
	R:	Granny dosn't like it!
0041		Put it in the box, then, if Granny doesn't want it.
0042	M:	[⌿kʌ̈]
0043	G:	Going to put it in here? (points in box)
	M:	[⌿ɑɛ] (wanders away)
0044	R:	Put it in the box.
		(M comes back)
	M:	[⌵ʊ1] (gives shoe to G)
0045	G:	Granny put it in the box then. (takes shoe and throws it in box)
		Goodbye shoe!

```
      M:  [ M 1 3 (bends down, picks up book and gives it to G)
1046  G:  What's this? (taking book)
1047  M:  C-sT 1 (turns round and walks over to R carrying something)
      R;  What have you got there? What is it?
      M:  [A3":3          .
      R:  What's this?
          (G picks up panda to attract X's attention)
1048  G:  Panda.
      R:  I'll just disappear for a minute and get my things together and then
          I'll come back.
1049  G:  Yes. Is that panda?
1050      Ooh, aah, yes.                         }
      M:  Help you with the famous pictures J
 051  G:  What else is there, Manuela?
      K:  [ 'O 3 (shows G a picture)
      G:  Oh.
1053  M:  [* k $ 3 (picks up picture of car)
      G:  Car! Yes! (laughing)
•054      You do like the car, don't you?
          And this is the car, isn't it? (picking up book)
1056  M:  (walks away) C '29 '2^3
1058      Is this the car?
          (G goes after K)
1059      Oh, I think she was looking for you - to show you...,
      R:  Oh, I'm sorry...                      7
      G:  I wondered where she was going....)
 060  R:  I didn't tell you where I was going, did I?
      G:  Yes that's car, yes. She said that one quite clearly.
 061  R:  Did she? Did you say car?
 062  M:  [vbD:] (pointing to ball)
      R:  Oh ball! Did you hear that?
1063  G:  Oh! Ball! Very much more distinguished!
      R:  Ball! What's this? (throws ball)
      X:  [v£o3 (throwing ball)
      R:  Give the ball to Granny.
1064  M:  C-S'-:/vTa (clinging to R)
      R:  Oh, alright, Mummy stay here.
1065  G:  You're a little bit..;)
      R:  Mummy stay here.... J
1066  G:  What's that? (showing X a book)
>067  R:  What's this? (pointing to book)
      X:  [-3: u:3 (picks up book)
      G:  Is that your bath book? Have you had it in the bath?
          (X gives book to R)
      R:  Yes, we have, (taking book)
)068      (X walks away)
)069  M:  (returns with picture of car and gives it to R) U^g: u:3
      G:  That's right!
      R:  (taking picture) A car. Another car, This one's a car. And is this one
          a car as well? (pointing)
)070      (K shakes rattle)
      G:  What is Spanish for car?
)071  R:  Carro. Which just sounds very similar.
      G:  Carro. Oh, ah, yes, very similar.
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	R:	What's that? (pointing to book)
	M:	(whispers) [ka:o] (points)
	R:	What's this? (points)
072	M:	[-bɔ] (points)
	R:	/bɔ/ Yes, and what's this one? }
	G:	Where's Manuela's ball? (looks for it) }
	M:	[-gu:]
	G:	Where's your ball? Where's your pretty coloured ball?
073	R:	It's /gu/ she say's.
074		(explaining)/gu/:gone!
		What's this?
075	M:	[-ɔ]
076	R:	Has it gone? Mummy go and look for it. (gets up and goes out)
		Perhaps it's here.
077	M:	(runs after her) [-gu'u'u'gu'gu'gu'u'ʊ]
	R:	No, it's not. Did you have it upstairs with Helen?
	G:	What is it? Is it that little felt ball?
078	R:	No, the big ball, I was thinking of.
079	G:	No. We had it this morning. Manuela! What did we do with it? }
	M:	[-gu. gu] (coming and giving rattle to G)
	G:	Yes, we played football, she and I }
	M:	[-mə..mə.-mə]
	G:	Here we are! (holding up ball)
	R:	Oh, Manuela, look!
	G:	Manuela! Look here's a little one, Manuela. (shakes ball so bell rings)
080	R:	Manuela, kick it to Granny.
081		(calls) Look what we've got here! Look! What's this?
082		(M comes back with telephone
083	M:	[-ǯ'↙əo]
084	M:	[↙a:o'↙a:o] (holds up telephone) }
	G:	Oh!
085	R:	Ah! Telephone!
086		Have you played telephone with Granny before?
	G:	Er, yes, not today
087	R:	She's just been getting the idea of talking to Daddy on the }
		telephone.
	M:	[↓da:o'ǯ] (gives phone to R and picks up picture of car) }
088	R:	Car!
		(M takes picture to G)
	G:	Yes, she whispered it into the telephone: didn't she before?
	R:	Yes, she still does.
	G:	Who's that?
090	R:	(into telephone) Manuela! Hello! You want to have a go? (putting phone
		to M's ear)
	M:	(running away and shaking head vigorously) [↙əo.-ʒ'ʒ'rə'rə'ʒ↙ʒol
	R:	Telephone?
091		(M goes over to R and allows phone to be put to her ear)
	M:	[↙a:]
	R:	Hello! How are you today?
	M:	(finds something on sofa) [mə.m'mə]
		That's Grannny's umbrella. It's round and shiny.
		(M and R stroke umbrella)
092	G:	One of the most attractive things about this age is the way they bend
		forward to do things, isn't it? Yes, it's very attractive.

0094	R:	Mm (laughs agreement)
0096		(M leaves room)
0097		She is much more active now. There's a difference: having had a sleep and a decent meal.
	G:	Yes, she is , yes, and....sort of communicating better.
	R:	We could always do it at this time actually, if we had lunch early.
	M:	(coming back in with toy car) [⁻m ' ⌐nӕ:] (gives car to G)
0099	G:	Oh, what have you got this time?
0100	R:	Oh, that causes dreadful frustration for her.
	G:	Oh, does it? Because it won't run along very well?
	R:	Well, it does, except not the way she tries to do it, and she gets angry with it.
0101	G:	Have you seen that thing at the crèche that has leather flappers on, and she pulls it along?
	R:	Oh, she loves that.
0102	G:	Oh, she absolutely adores it.
		(M picks up picture from R's lap)
0103	R:	Yes. Oh, d'you want these back? I thought you were fed up with them.
	G:	What about the pandas?
0104	M:	[↘uʊ] (picks up another picture and gives it to G)
	G:	Thank you. Can I have them? (M snatches panda picture away) Oh, alright, I won't have them then.
		(M gives them to R)
0105	R:	Thank you (taking them)
		(M runs out of room)
0106		She's suddenly brightened up a bit.
0107	M:	(from outside) [⁻m mɔ. ⌐m] (runs back in with picture and gives it to R) [⁻m mɔ. ⌐m]
	R:	What's that?
	G:	Can I see it please?
0108	R:	Thank you. What is it? (taking it)
	M:	(shakes head) [⌐ɔ]
		(M runs away)
	R:	(laughing) You're not going to tell anyone!
0109		(R and G laugh)
	G:	She says all this playing is far too contrived!
		(R looks at book)
0113	R:	(calls) Manuela!
0115		(M reappears pushing cart) Oh, her favourite cart! Ooh, Granny gave that to you, didn't she?
0116	G:	Yes, you're very good with it.
0117	R:	She's so good now that she can now decide when to purposely bump into anything. She's getting so she'll run into your feet, although she knows perfectly well how to go round.
0120		She loves it actually. She pushes it up and down energetically.
	G:	Good. Well. I'm glad she does. She's got enough room here, hasn't she?
0121		(M appears)
	R:	Go and get your cart. Go and get your cart.
	G:	(putting toys away in the box) Well, that doesn't go in the box, does it?
	R:	Manuela! (M brings cart for her)
0122	M:	[⋀ʔ]
	G:	Is that the cart?
	R:	Yes, do you want to push it? (M looks in box where G has put toys)

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0123  G:  (pointing) Do you want to push this? No, we've just put everything
          away.
          (M pulls animal on wheels out of box)
0124  R:  Oh, not that dreadful thing!
0125      (M brings over animal on wheels)
          She always bring this to me, and I show her how to pull it, and she
          can't. Have a go then!
0127  M:  [ ʌhə ] (cries in frustration because can't pull toy)
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End of tape.

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0000  G:  Now, that's Mama's, is it?...looks like a house.....
      R:  What is it?
          (M reaches up)
0001      Do you want a cup of coffee, or do you want to wait until she has he
          snack?
      M:  [ ˌmə'ˌmə'ˌmə ]
0002  R:  Yes, Granny's going to get out the box of things in a minute. Mm?
          Shall we go and get the box of things?
0003      Look! What's in here?
0004      Granny's going to come and look in a minute. Look! (tips box up)
          You look in there, mm?
          (M peers in box)
      M:  [ ˋnoʊ ] (shakes her head)
0005  R:  No? Don't you want anything in there? Hey? Mm?
          (M peers into box again)
      M:  (pointing in box) [ nɒ'mə ]
0006  R:  (reaches inside box and brings out panda) What's this?
      M:  [ ʌ a: ] (points in box) [ ˋʊ: . ʊ ]
      R:  Book? (reaches in box)
0007      (pulls out book) Ooh! There we are!
0008  M:  [ ˉʊ ] (Peering in box)
      R:  (imitating her) /u/ (pulls out shoe)
      M:  [ ˉɒ ] (pointing in box)
      R:  (imitating M) /ɒ/
0009  R:  There we are (reaching into box)
          (Granny walks in. M hands her a picture of papa)
      M:  [ ˉpə'pa ] (whispered)
      G:  Where is papa? He's not the other side of the world, is he?
0010  R:  Well, papa is going to Mexico on Saturday. That's another story I
          shall tell you about.
          (M pushes box to G shaking her head)
0011  G:  Has it gone?
          (hands M picture) Shall we put papa in there?
0012      There's papa. What else is there? Who's that?
          (M hands her photo of panda)
      M:  [ ˌp ə ] (whispered)
0013  G:  Panda?
          (M takes picture of panda to R)
0014  R:  Panda! I think I'd better go upstairs and get a few more books.
      M:  [ ˉpæ . ˉpa ]
      G:  Yes, that would be a baby panda in China.
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0015  R:  Oh, yes, because we saw that on television,        7
      G:  Yes, wasn't it sweet, they all went aah! Gorgeous!J
      X:  I v 3: 3
      G:  Panda! Is this panda too? (holding panda up)
          It's another panda isn't it?
      X:  (takes panda) C p^  ] (whispered)
      G:  Ah! Panda!
0017  M:   (points to something and runs towards it) I - b d £  ]
      G:  Mm?
      X:  L f* ] (gesturing towards object)
      G:  Yes, that's baby, isn't it? So, we won't have that just now, Manuela,
          We'll look at these (fingering pictures)
0018      (G picks up watch and puts it to her ear) Vhat's this?
          (X comes over to see)
          Does it say tick tock?
0019  X;  (pointing) C -d-1 '-di3
      G:  It doesn't, does it? (puts it to her ear)
      X;  (shakes head) [ v n o u  ]
      G:  No, Has she had a nasty cold?
0020  M:  [-ry» ] (holding something out to R)*≥
      R:  No, she's got a bit of a cough.        I
      G;  Oh, I thought she smelt of those things you put on her.
0021  R:  No, I'll tell you what does smell though, turpentine, I had turpenti]
          to clean something.
      X:  [*m9 .-rvu'jfti 'dw 3 (out of sight of camera)
      G:  Oh, yes, yes .
      X;  [ -fc: u: 3
0022  G;  Ah! Who is that again? Is that panda again?
          (X reappears with picture and shows it to G)
          Panda? Is it panda?
0023      What else can we find? (sorting through pictures)
          What else can we find, Manuela? Who,,,what's happening here? Is
          this a baby,,,a little boy or a litttle girl? (opens book)
          (X, not interested, wanders away)
          Vhat's he doing?
          (X drops card she is holding and bends down to pick it up)
0025  X:   (whispers) [-Jc^]
          (X stands up and looks in box)
      G:  Put it in there? There's nothing in there. No, nothing in there, is
          there?.
0026      (X pushes box towards R shaking her head)
      X:  C -u ' w : 3
      G:  No, empty.       7
      R;  Yes, thank you[1]/
0027  R:  Give it to Granny. Give it to Granny^
      G:  What can we find in here, Manuela? J
      G:  You show me, Look, I love this book, can you show me this book?
          It's a very special book, isn't it?
0028      (M comes over and picks up a different book)
          Oh, and tha's a nice book, too. Can I see that?
          (X gives her the book) Who's that? Is that a lion?
0029  X:  (picks up shoe) t'ba 3
      G:  That's your....Xummy's shoe?
      X:  (gets up and takes shoe to R) [-ba..иɜ
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	R:	Shoe.
	G:	Shoe.
	R:	Shoe, She says shoe as well.
0030	G:	Shoe! Is it?
	M:	[^ ˆwi]
	R:	take the shoe to Granny. She loves that shoe,
		(X brings shoe over)
	G:	Oh, thank you.
0031		Ooh! D'you know what Granny's got?
	R:	Granny's got some shoes , Take it to Granny.
		(G leaves room)
		I think Mummy might go away for a minute,
0033	G	(comes back in with bag) Look, Manuela, what Granny's got.
		(emptying bag) Granny's bought...what are these? What is in here?
0034		(unwraps parcel, M watching) New....(shows M shoes)
0035	X:	(pointing at shoes) [J]
	G:	Shoes for Granny. Shall we put them on? Granny put them on? Can you put them on for me? (untying own shoes)
0036		What is that? Granny's new.,,(puts shoe on)
0037		Shoe.
0038	X;	(pointing at other shoe) Cu ᵛw]
	G:	And that one, (takes off other shoe) Granny's other shoe,
0039		(M points at shoes) Km, d'you like them? What else have you got here?
0040		Can you show me Nattie's book?It's very special, isn't it?
0041	M:	(runs towards where R had been standing) [^.. ^nou]
	G:	No, no!
	X:	(hands G card) [. 3f]
0042	G:	Yes, are you going to put that in there? You bring the box here and put some of the things in, shall we?
0043	M:	(bends down and picks up toys) [-t>^]
	G:	Now, what are you going to put in? You look at it?
0045		What's that (pointing) Window?
0046		Is it? What else is there there? What can we find?
	X:	(waves panda card at her) Cp̧ 3
0047		(G shows M pictures attempting unsuccessfully to get her to. speak)
0054	G:	Who's that? (showing M picture of a ball) Ball.
0055	X:	[vO:] (pointing)
	G:	(pointing) There's a ....train.
0056	X:	(points at book) C ^ 3
	G:	Little boy playing with a ....drum.
0057	X:	(pointing) [vbDil]
	G:	Ball, yes,
0058	X:	[* lea*'. 'a:]
	G:	Car. Teddy, (points) Boat? And there's a trumpet. You have to go,.. (blows) and blow the trumpet.
0059		Of blows)
0060	G:	Little girl. Girl.
	X:	(blows)
0061	G:	(blows) Yes, that's right, It makes a noise, then, doesn't it? And that's a,.,,bang! bang! bang! That's a gong. And that boy's playing the!
0062	X:	$l^K 3T{>}V$ 3
	G:	Drum! Gong!
0063	X:	$ib^* *$ - A 3
	G:	(laughing) It makes a nice noise, doesn't it? And there's a big ball

0064   M: [ˋ m̃]

G: (pointing at shoes) What are those? Granny's...?

0065   M: [-gu]

G: What else is there? Shall we find one of those new books? Shall we

0066   (M runs off to look for R)

M: [ə̃]

       (M sits on G's knee looking at animal book)

G: Come on then, lets have a look here. Oh look, I havn't seen this on

      Come and see this one Manuela.. Look, I havn't seen this camel. Is

      a camel?

0067   M: [ˎn ə u]

G: Isn't it? What is it then? It's a camel. And that's a kangaroo.

      What is it?

M: [-gɑ : u]

G: A kangaroo and a....

0069   Goat.   ⎫

M: [ˎgə o] ⎭

0070   G: And that's a....deer. Goat? And...zebra.

M: [-gə o]

G: And an elephant

0071   M: [- m̃]

G: Mm, penguins.

0072   Polar bear.

M: [ˎd ɒ ʔ]

0073   G: A crocodile and a pelican...Wait a minute...a hipopotamus.

M: [-gɛ 'g ə]

G: And a giraffe.

0075   M: [ˎd at . d aʧ ˎˎ d aʧ ˎˎ d aʧ]   ⎫

G: That's a little dog. Is that a little dog?   ⎭

M: [ˎd ɛ d 'ʃ ˎˎ d ɛ d 'f]

0076   G: What's over here? You show me.

0077   What else is there? Careful, don't fall over. All the cards.

M: [k ə̣ .. k ə̣ u] (whispering, holding up Picture)

0078   G: Car. (looking through book)

      Clock

0079   G: Clock.

M: [-g ʊ ʔ]

0080   House?

0081   M: [ˋŋ a u] (shaking head)

G: Oh, who's that?

M: [ˎo u . m̃] (looking)

0082   G: Dog? And what does tha dog say? He says?

M: [ʊ̓ ʔ]

G: (imitating her) Doesn't he? Look (pointing at picture)

0084   M: [-ç ʊ̓] (pointing)

G: Pandas again...Pandas (looking through pictures)

0085   M: (picks up a picture) [p ə̣ 'p ə̣]

G: (laughing) That's not papa! That's a horse!

0086   What is it? A horse!

0087   That's not papa. It's a horse.

0089   What else have we got? (M gives G a picture)

      House, that's a house.

0090   And that one? (M gives G empty card)

M: [-ɲɑːu] (M shaking her head)

G: No? No. not one on there, is there? No, there's not one on there, is there? No.

0091 What else have we got?

0092 M: (picks up picture of papa) [pɑ 'pɑ]

G: Yes, that's papa, isn't it? (M waves picture)

0093 That's right. Are you going to put it in the box? (gathers up pictures) You want to put the pictures in the box.

0094 M: [ˈgʊʔ] (seeing picture of watch)

0095 G: Put them all in the box, shall we?

That's right (M putting them in box)

0096 And the book in , yes.

0097 M: [ˌbʊm]

G: Yes.

M: [ˌbʊ] (still putting picxtures in box)

G: And that's....

M: [ˌb ʊ]

0098 G: What is that, a dog?

M: [-ʒ]

0099 G: Who is that? A picture of...?

0100 M: ɬbɑ .. ˌʊm]

0101 G: That's right. Put them all away.

(R comes in)

0102 M: [   ]

R: Look! (puts 2 balls down)

G: Oh, more balls!

R: How've you been getting on?

M: [-ʉː]

0103 G: Well, I'm not sure. She's not been very communicative. We looked at papa, and then she found a picture of a horse, so that was papa t

0104 Who's that? (showingM picture of papa)

(M ignores her and shows R and G toy she is holding)

M: [ˈgæ]

R: What'S that? (M carries on putting everything in box)

M: [ˌm]

End of tape.

Appendix 2

List of vocalizations classed as 'words' (followed by no. of occurrences in d if more than one.)

English gloss	Phonetic variations	Source word.
animal/soft toy	[m̥]$^{(18)}$	moo (Eng)
ball	[bɔ:] [bɔ:l] [bɔ] [ɔ:]$^{(2)}$ [ɔ]	ball (Eng)
book	[bʊ]$^{(2)}$ [bʊm] [ʋ:]$^{(2)}$ [ʋ] [ʋ̥]$^{(2)}$ [ʔʋ] [ʉ]$^{(3)}$	book (Eng)
car	[kḁ] [ka:] [kḁ] [kḁ]$^{(2)}$ [kḁɥ] [ka:ɥ] [ka:o] [kaa:'a:]	car (Eng)/ carro (Span)
clock/watch	[ga] [gæ] [gæ:]$^{(2)}$ [gʊʔ]$^{(2)}$ [gä]	clock (Eng)
duck	[da]$^{(2)}$	duck (Eng)
goat	[gəo]$^{(2)}$	goat (Eng)
gone	[gu:] [gu] [gʊo] [gu̥]$^{(2)}$ [gu'u'ɥ'gu'gu'gu'ɥ'ʔ]	gone (Eng)
gong	[gɒŋ]	gong (Eng)
kangaroo	[gɑ:u]	kangaroo (Eng)
Manuela	[mã] [m'a] [mä] [mæ:]	Manuela (name)
no	[nou]$^{(3)}$ [nəu] [ɒʔu] [na:u:]$^{(2)}$ [nɔ]$^{(2)}$ [nəo]$^{(2)}$ [nə]$^{(5)}$ [noʊ]	no (Eng)
Papa	[pḁ'pḁ]$^{(3)}$	papa (Span)
panda	[pa]$^{(2)}$ [pḁ']$^{(2)}$ [pæ] [pʔ]	panda (Eng)
shoe	[ba]$^{(5)}$ [ba'a] [u:]$^{(2)}$ [u'u] [ɥ:] [u'ʊ] [gu] [ʔʊ] [ʊ] [ʃ] [ʊ'wæ 'wə]	shoe (Eng)/ zapato (Span)
/bʌ'wʌ/ /ʊ̥ʔ/	[bə̥'wə̥] [ʊ̥ʔ]	noises made by dogs (Eng)

Total number 'word' tokens   112
Total number 'babble' tokens 130
TOTAL 242

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