

**"Semantic Categories in the acquisition of Langue des Signes Québécoise
(LSQ) and American Sign Language (ASL)"¹**

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**Paper Presented at the
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"Semantic Categories in the acquisition of Langue des Signes Québécoise (LSQ) and American Sign Language (ASL)"¹

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1.0 Introduction

The study I will present today focused on young children's acquisition of lexical items. Subjects were the deaf children of deaf parents, who were acquiring two completely distinct sign languages.

Specifically, we examined the first fifty signs of deaf children acquiring American Sign Language (ASL) and deaf children acquiring Langue des Signes Québécoise (LSQ), with an eye towards making comparisons to both our own and existing data concerning hearing children's first fifty words and semantic categories (as in, Nelson, 1973). Few studies exist on the topic of semantic categories in ASL (see only Newport & Ashbrooke, 1977), and none--to our knowledge--with regard to any other sign language.

LSQ is the naturally evolved sign language used by deaf members of the French community in Quebec, as well some other parts of French Canada; its lexicon and grammar are distinct from ASL, and from spoken French. Incidentally, a completely different sign language is used in France.

1.1. Objectives: One objective of this study is to provide the first data on deaf children's first fifty signs. However, given the gestural form of sign language the course and nature of sign acquisition is not completely obvious. In fact, there was a real possibility the modality would influence the course of lexical acquisition for at least two reasons.

First, some signs resemble aspects of the objects that they represent: they are iconic. For example, consider the gesture that one produces with a hairbrush in hand. Now consider the form of the pantomime for brushing one's hair. Finally, consider the sign BRUSH in LSQ (as well as ASL; the forms of a very small class of signs are similar in both sign languages. This sign was chosen for investigation because it represents one member of this "overlapping" class). Note that there is a literal isomorphism between (1) the gesture for a common object, (2) what one would do with that object in hand, and (3) the sign. While the forms of some other signs resemble common gestures that are typically found in all young hearing and deaf

children ages 9-28 months (see Petitto, 1985; in press). For example, the "waving hand" gesture is (1) a formationally natural, unlearned gesture found in infants (beginning around 9-12 months old), (2) the socially acceptable "good bye" gesture, and (3) the sign "GOOD BYE". Indexical pointing gestures are a special case: their meaning is literally transparent: For example, this is true for personal, locative, and demonstrative pronouns in ASL and LSQ.

There's a second reason why language acquisition in this modality might be different. During the time when young hearing children are acquiring their first words in the verbal channel, they are also producing gestures in the manual channel (they gesture with objects in hand--e.g., hammering, brushing--and they gesture without objects in hand--e.g., pointing to things around them). The existence of such gesturing has been said to play a critical role in hearing children's acquisition of linguistic forms. Some researchers have said language forms are directly mapped onto this pre-linguistic gestural foundation (e.g., Bruner, 1975), while others have regarded gestures that co-occur with first words as having full and "equal symbolic status"--thereby, yielding support for their claims that language acquisition involves a general cognitive capacity to symbolize rather than language-specific knowledge (e.g., Bates, Bretherton, Shore, & McNew, 1983).

1.2. Predictions: The existence of sign language presents a powerful test of such theories. For deaf children, signs and gestures occur in a **single** channel at the same time. Both gesture and sign "refer", both are communicative, and both can convey the child's intentions. An important question is **will** the young deaf infant differentiate between gestural and linguistic means of expression in the early stages? One possibility is that deaf children will **not** differentiate these 2 means of communication--both signs and gestures should have "equal status"--that is, equal extensional/intensional status. A second related possibility is that sign iconicity and sign transparency may enable deaf children to acquire signs at an earlier age (and accelerated rate) than hearing children acquire spoken language (as has been proposed by some researchers, e.g., Bonvillian, Orlansky, Novack, Folven, & Holley-Wilcox, 1983).

Hence, deaf children's early vocabulary could differ from hearing children's because of these difference between the modalities. That would be expected if language is built up out of gesture. This was one question addressed in the present research. Would the course of lexical acquisition differ because of the modality?

Incidentally, if this were true, then the course of acquisition could differ **between** sign languages as well. **Why?** Because the signs that are transparent, iconic, or related to common gestures differ in the two languages. [Show example: the signs COOKIE and DELICIOUS in ASL versus LSQ]

2.0 Subjects

Three deaf children with deaf parents participated in this study: 2 LSQ and 1 ASL . The

LSQ children were **male twins**, with a deaf brother (age 3 at the time of their birth). The ASL child was male with a deaf sister (age 2.5 at the time of his birth).

3.0 Methods

The children were videotaped monthly, from ages 9 through 30 months. Four controlled elicitation tasks were employed to encourage the children's production of signs at each videotaping session. In addition, the children's comprehension of signs was informally assessed.

The four tasks were as follows: (i) free play with objects, and self-other picture and mirror identification task, (ii) "frustration task" (desirable objects in closed glass jar); (iii) 24 common objects for naming/gesturing (objects in hand condition); (iv) 24 pictured objects for naming/gesturing (same objects as in iii, but objects not in hand condition).

Detailed transcriptions of each videotape were made by 2 independent observers (including a native deaf signer), noting **all** (1) linguistic forms (signs), (2) gestures, and (3) actions produced by the child. Information about the manner, form, content, function, and context of every sign, gesture, and action was also noted; mothers' signed utterances (as well as their gestures) were transcribed in the same manner. All of this information was then entered into a computer data-base.

Use of this data-base permitted systematic, frequency and distributional analyses of sign and gestural forms across hundreds of contexts. Today's analysis spans over a combined total of over 2,500 computer entries--where each entry represents a communicative interaction between the child and mother, or child and experimenter.

Attributions of sign status were not based exclusively on the behavior's function or use; nor, were they based on mother's reports or on our raw intuitions about what I thought the children's signs and gestures meant. Instead, **all** manual activity was evaluated along the **same** dimensions as follows: whether the form was (i) stable across multiple contexts, (ii) used in communicative **and** semantically varied ways, (iii) a stable form used consistently to designate a class of related referents of kind (relevant to object names, in particular), and (iv) a form not restricted to particular exemplars of a kind. If multiple forms are used to refer to a particular referent, each must independently meet the above conditions.

To determine "natural kind" information I examined a form (be it sign or gesture) and the entire range of referents that it was used for. Conversely, I examined the each referent and all the forms (signs or gestures) that were used for it across all contexts.

Finally, intra-sign language comparisons were made regarding children's first 50 signs in LSQ and ASL, as well as comparisons between the acquisition of semantic categories in signed and spoken languages.

4.0 Results

4.1 The First 50 Signs: Overall Summary.

The two basic findings in this study were as follows:

4.1.1. Deaf children's first signs consisted of highly similar sign types and semantic categories as has been observed in hearing children--a finding that provides surprising and powerful, cross-linguistic, cross-modal (cross-cultural) evidence regarding a highly general course of word/sign meaning acquisition. Despite a radically different language structure and very different linguistic and cultural environments, the deaf children acquiring ASL and LSQ communicated about the same basic kinds of things; moreover, their lexicons were also comparable to the early lexicon of hearing children.

4.1.2 Deaf children acquire their first signs at a similar age and rate as hearing children acquire their first words. Recently, there have been reports that children acquire signs earlier than children acquire spoken language (e.g., Bonvillian et al, 1983). However, as I have argued elsewhere (Petitto, 1985; in press), I believe such claims are wholly unfounded. Briefly, the claim derives from the researchers' (1) over-attribution of meaning to deaf children's early gestures and other motoric hand activity--this is especially true of the hand activity that is common to both hearing children (who are not being exposed to sign language) and deaf children, (2) a failure to distinguish meaning and reference, and referring versus symbolizing, and, (3) a failure to distinguish deaf children's attempts to imitate actions--and, especially, attempts to imitate signs without an understanding of their meaning--without even an intention to mean anything at all.

Further, the sign iconicity did not enable deaf children to acquire language at an earlier age. If anything, the 2 LSQ boys acquired their first signs slightly later--a development that is entirely consistent with the literature on language acquisition in twins, and young boys.

4. 2. The First 50 Signs: Data.

4.2.1 Sign types: Tables 1, 2, and 3 on your handout provides you with the actual list of the 2 LSQ children's and 1 ASL child's first 50 signs by age.

Note that this represents a conservative account of the signs, as protosigns and uninterpretable signs were not included here; this list is drawn exclusively from our experimental tapes. Note also that it was difficult to find exact English glosses for some of LSQ's signs, e.g., "BRAVO" (roughly meaning "very good, excellent"). This is to be expected because we went from LSQ into French, and then from French into English so that this English audience could understand the meaning of the lexical entries. Finally, note that the + symbol represents compound signs.

Data were compared to my own data on hearing children's first word acquisition (e.g., Petitto, 1985, in press) and published reports, including, those reported by Roger

Brown (1973) for Adam, Eve, and Sarah, those reported by Lois Bloom (1973) for Allison, reports in Slobin, 1986, and, of course, Katherine Nelson's (1973) report for the first fifty words of 18 children.

Like hearing children, some of the deaf children's meanings are related to familiar manipulable objects first. However, note the presence of non-object signs; these are actually greater in frequency than the object signs (an observation that is relevant for refuting claims about the advantage of concrete, iconic signs in sign acquisition).

Point out other intra-sign comparisons.

4.2.2 The effects of age, rate, and sign transparency and iconicity:

Note that sign iconicity and sign transparency played little role in the age of their acquisition.

Example: Pronouns are acquired well *after* the children's first signs, despite the fact that they are formed with the simple pointing gesture (a form that the children began using as a communicative gesture--but not sign--beginning around the same age as hearing children, i.e., age 9 mths; see especially, Petitto, 1987).

Furthermore, iconic signs in ASL were not learned faster, earlier than their semantically equivalent (but formationally different) non-iconic signs in LSQ--and vice versa.

4.2.3 Semantic categories: Please refer to Figures 1 & 2. The semantic categories expressed in this tree were proposed by K. Nelson (1973). I applied our data to this tree as a means of comparison. The point in this activity was to compare the children's overall type of lexical items with that reported for hearing children. The important thing to note is the distribution of sign types that are being expressed--not that all the nodes aren't filled in--the variation is due to individual differences, testing environment differences, etc.

CAVEAT: I hasten to point out that I am fully aware of the caveats in using such a category system. Our use of it in no way conveys our implicit support for the functional core model of early word meanings--it does not. Again, our sole goal was to find some way to compare our deaf children with existing cross-linguistic data on this phenomenon in hearing children. As it happens, Nelson's herself provided data for 18 children using this classification system, and Slobin reports similar data for 15 different languages--from 8 different language families.

4.3. Summary of Part One (first 50 signs and semantic categories).

Three basic findings were discussed:

(i) deaf children acquiring the two sign languages had very similar vocabularies; differences between sign languages didn't matter.

(ii) deaf children's vocabularies were similar to hearing children's, and they were on a similar time course (even the male twins).

(iii) Differences in modality didn't matter. Transparent and iconic signs were not acquired earlier.

The above work established a basic phenomenon. By now, many of us know the punchline by rote: "Deaf children acquire language just like hearing children". So, what's the interest? The issue is not that the acquisition patterns are the same, but why are they the same? Look, there are striking differences between the form and grammar of signed and spoken languages? Given the nearly isomorphic relationship between some gestures and signs, and the central role that gestures are supposed to have in language acquisition why doesn't the deaf child confuse gestures with signs, treat them the same, mix them up, get their referring properties confused? The real question is this: why isn't there a difference between sign and spoken language acquisition?

In the remaining portion of my talk, I'm going to argue that the reason deaf children don't get gestures and signs confused is because distinct forms of knowledge are guiding linguistic and non-linguistic indicating. That is, sign language acquisition studies in particular have yielded stunning evidence for a discontinuity between linguistic and non-linguistic knowledge: the very nature and essence of meaning and reference is uncovered here in. I'm going to argue that deaf children distinguish between signs and gestures right from the start. Further, I believe this to be true for hearing children as well. That is, contrary to other researchers claims in the literature (e.g., Bates et al., 1983), young children's first words and gestures are wholly distinct.

4.4. Gestures versus Signs/Words: Summary.

Please refer to Figure 3. The data from 2 hearing children are represented here; these data were drawn from a previous, larger study that I did (Petitto, 1985, in press). The data from this earlier study permitted me to evaluate deaf and hearing children's gestures versus signs/words (respectively) along the following dimensions: form, content, use, and frequency and manner of occurrence. One basic finding from this analysis was that deaf and hearing children's gestures were strikingly similar, despite the fact that the deaf children were acquiring a manual-visual language.

Several distinct classes of behavior were observed in all children: Actions with objects in hand (often called "gestures" in the literature), Empty-handed "gestures" (which we regarded as "true" gestures), head gestures (generally routine and socially appropriate head shakes and nods, such as yes and no) & Signs/Words.

By far, the most frequent type of behavior for both deaf and hearing children is "actions with objects in hand". Clearly, the most intriguing relationship exists between the empty-handed gestures and signs/words; this will be discussed further below. There was only one behavior type that was exclusive to deaf babies...

4.4.1 Sign language babbling: Deaf children babbled in sign language beginning

around 9 months old--the babbling forms contained canonical, "phonological" units relevant to the acquisition of sign languages. This is the first time this phenomenon has been formally studied (see Petitto, 1987, in preparation). The difference between sign babbling reported here, and **vocal** babbling reported by Lenneberg (1967) is that the former contained canonical, language-specific forms and the latter did not; apparently, **speech input** is crucial for the occurrence of vocal canonical babbling (Oller & Eilers, in press). Moreover, similar sign babbling forms were observed in ASL and LSQ; surprisingly, there were also language-specific variation in sign babbling forms among the deaf infants.

4.4.2. Signs versus gestures--Time course: Please refer to figure 4. This figure gives you an idea of the time-course and relative frequency of gestures versus signs over time. Note the gestures sort of stay the same throughout development. The signs come in and take-off.

4.4.3 Signs/words versus empty-handed gestures--Knowledge constraints: One of the most surprising findings of this study is that children's use and comprehension of gestures (both pre- and post onset of signs/words) are fundamentally distinct from their use and comprehension of signs/words; moreover, this difference is maintained throughout the entire course of language acquisition.

There were form, content, use, communicative function, semantic function, and comprehension **differences** between gestures and signs/words that existed right from the onset.

The critical differences with regard to knowledge types and constraints in the language acquisition process were as follows:

(1) violation of natural kinds (objects) constraints:

Children did not use particular signs/words across the bounds of different sign/word types: object names, event signs/words, property signs/words, etc. There were virtually NO overextensions from the start in our corpora. This is especially true for object words. In sum, there were NO violations of natural kinds for signs/words. The findings presented here with regard to first signs (and words) corroborates those reported for first words by Huttenlocher and Smiley (1987), in their elegant study recently reported in Cognitive Psychology.

Importantly, however, such violations were literally **routine** for gestures. A particular gestural form was used in unbounded ways, cutting across sign/word type boundaries.

(2) no symbolic gestures until **after** the corresponding sign/word was acquired (extremely few instances, even then):

Provide example: gesture for "open", sign and word OPEN: Same gesture observed in hearing and deaf children; same violations observed in hearing and deaf children for the gesture but not for the counterpart word and sign (respectively).

Other differences noted were as follows:

(i) most all gestures were restricted exclusively to instrumental communicative function of

requesting--but this was not true for signs/words

(ii) stunning comprehension asymmetry in **both** hearing and deaf children. In the next paper Kathy Hirsh-pasek will be speak about comprehension preceding production in the acquisition of **linguistic** forms. Here, however, the reverse is true for children's gestures: children's production precedes comprehension vis-a-vis **gestural** forms.

(iii) no gesture+gesture combinations even when there were sign+sign (and word + word) combinations.

4.5 Summary of Research Findings.

(1) deaf children acquiring the two sign languages had very similar vocabularies; differences between sign languages didn't matter.

(2) deaf children's vocabularies were similar to hearing children's, and they occurred on a similar time-course (no age and rate advantage, no effect of iconicity/transparency).

(3) Striking distinction between gestures and signs/words right from the start; both deaf and hearing children's signs/words use did **not** cross the bounds of different sign types, although gestures routinely did.

Thus, deaf and hearing children do not confuse the referential properties of gestures and signs and words (respectively) because the knowledge underlying them appears to be organized along distinct domains (and possibly constrained by distinct organizing principles) right from the start. This claim gains particularly powerful support when evaluated in the context of signed languages where there is very close similarity between gestures and signs (formationally, referentially), and where this information is conveyed in a single channel. Note also that researchers claims regarding the "equivalent symbolic status" of gestures and words are not supported by these data. Nor are we justified in concluding that a "single general cognitive motor" is driving children's ability to refer with gestures and words, as the current findings implicate language-specific knowledge in the **language** acquisition process.

5.0 Conclusion

This study provides cross-linguistic, cross-modal evidence that children appear to utilize similar semantic categories regardless of the language or its mode of transmission. Moreover, the clear distinction observed between the child's early use of gestures and their use of signs suggests that distinct forms of knowledge may govern linguistic vs. non-linguistic information in the language acquisition process. This particularly striking fact, supports current theories of conceptual and semantic organization of knowledge, in particular, the work of Frank Keil, Ellen Markman, Susan Carey, and others regarding a priori constraints on conceptual knowledge during development. Somehow the brain appears to honor a distinction between

linguistic and non-linguistic forms of knowledge, irrespective of the language modality.

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Patrick's first fifty signs-LSQ

age(mth)	signs	age(mth)	signs
18.....	drink		gone
	milk		yes
	bravo		apple
20.....	baby		dirty
	open	25.....	me
	what		eat
	cookie		pull out
	candy		red
	chocolate		car
	toy	27.....	put+on+glasses
	to change		there
	no more		this
	TV		you
22.5.....	again		put+in
	come		glasses
	book		hammer
	where		phone
	want		banana
	mother		close
	broken	30.....	mistake
	hairbrush		strong
	hot		sign
	good		name
	give		sock
	missing		no

TABLE 1

Claude's first fifty signs -LSQ

age(mth)	signs	age(mth)	signs
17.....	bravo		empty
18.....	drink	24.....	stir
20.....	open	25.....	bubble
	daddy+mommy		broken
21.....	cookie		red
	candy		apple
	again	27.....	dirty
	when		take
	give		there
	bird		me
	what		this
	no more	30.....	put+on+glasses
	raisin		eat
	thermometer		boat
	TV		hammer
	want		name
22.5.....	toy		ball
	car		other
	nice		stink
	good		cold
	to change		sock
	how		hurt
	book		he
	mother		birthday
	no		fork

TABLE 2

Victor's first fifty signs-ASL

age(mth)	signs	age(mth)	signs
13.....	open	22.....	orange
	eat		laugh
15.....	drink		chicken
	flower		bread
16.....	more		me
	phone		orange juice
	hat		pen
17.....	dirty		water
	want		no
	what		food
	brush	23.....	mine
18.....	help		mother
	tree		outside
	give		ball
20.....	sleep		bird
	hammer		please
	shoe		Laura
	telephone		throw
	funny		toothbrush
	boy		who
	wet		Megan
	good		see
	search for		glasses
22.....	thank you		delicious
	where		Vance

TABLE 3

Patrick's Semantic Categories

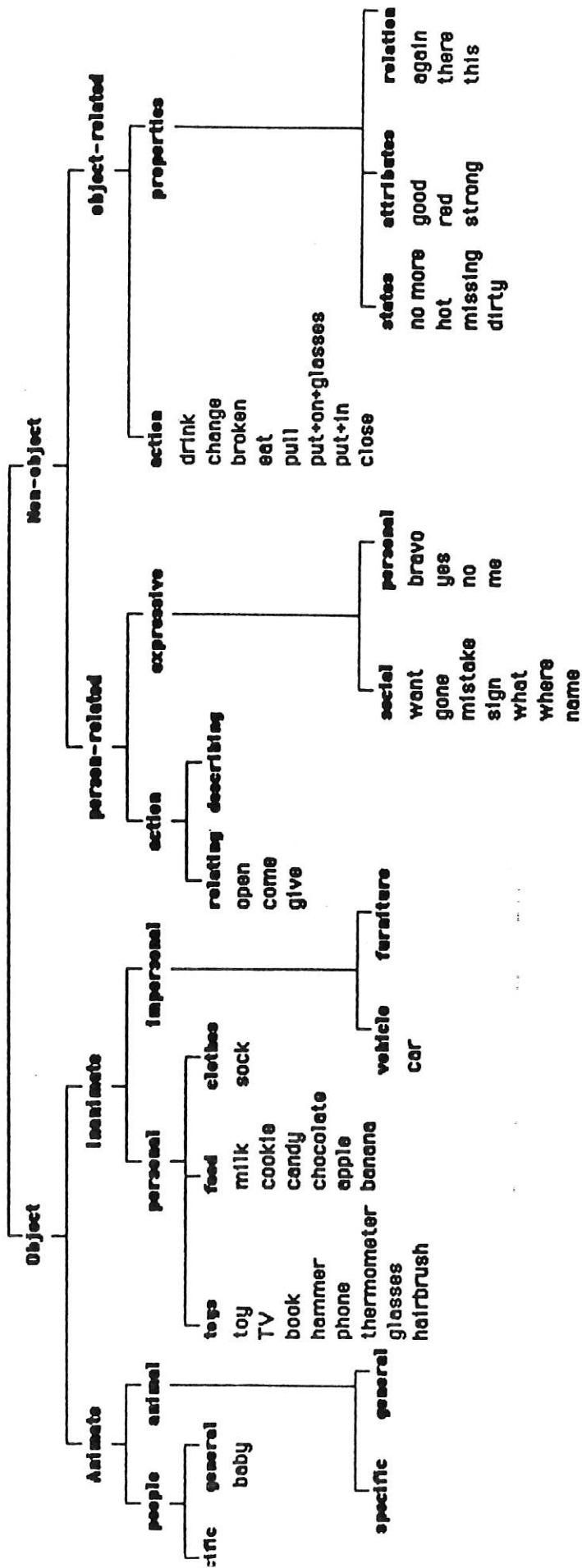


FIGURE 1

Claude's Semantic Categories

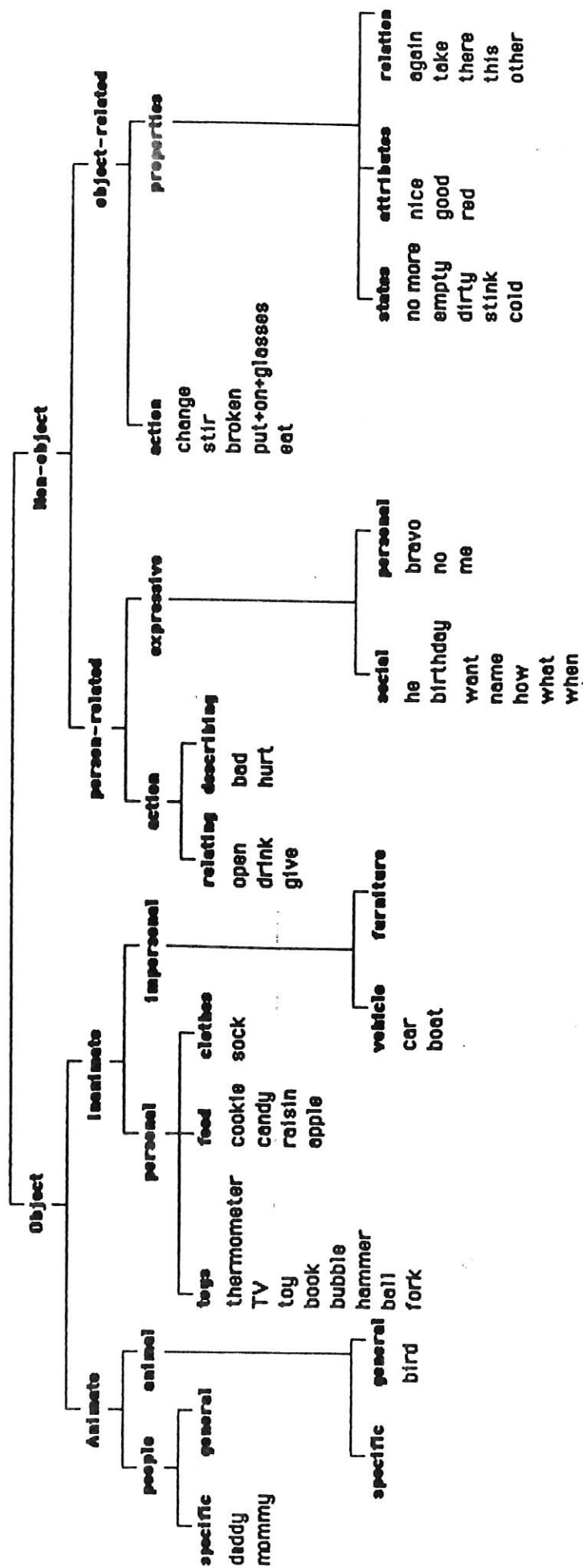


FIGURE 2

Distribution and Type of Behavior (Age: 10 to 24 month)

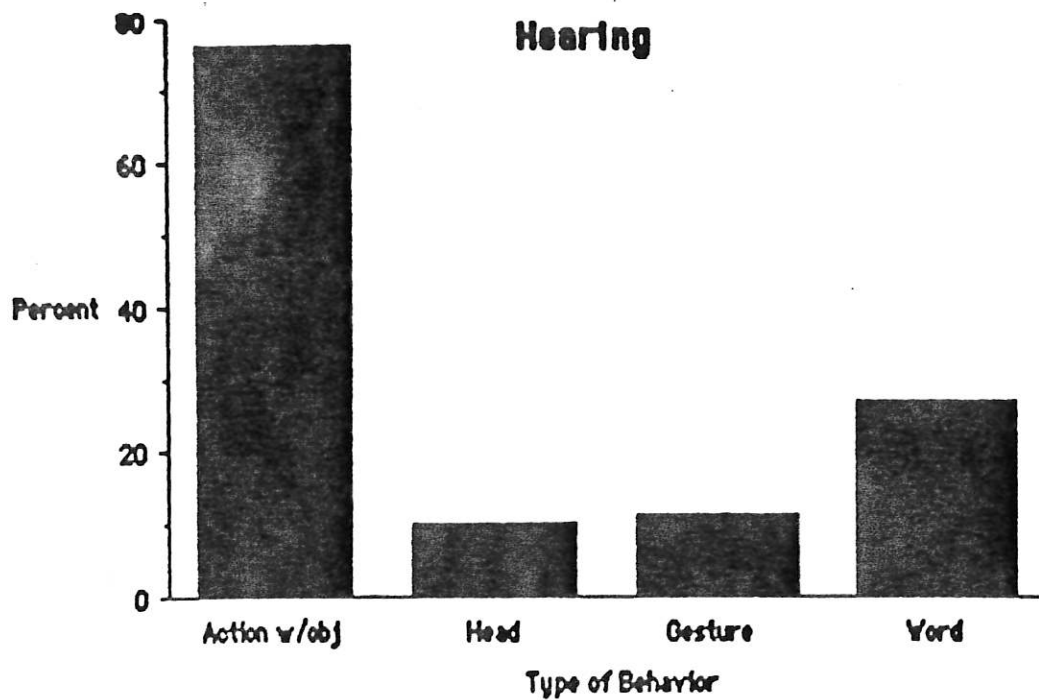
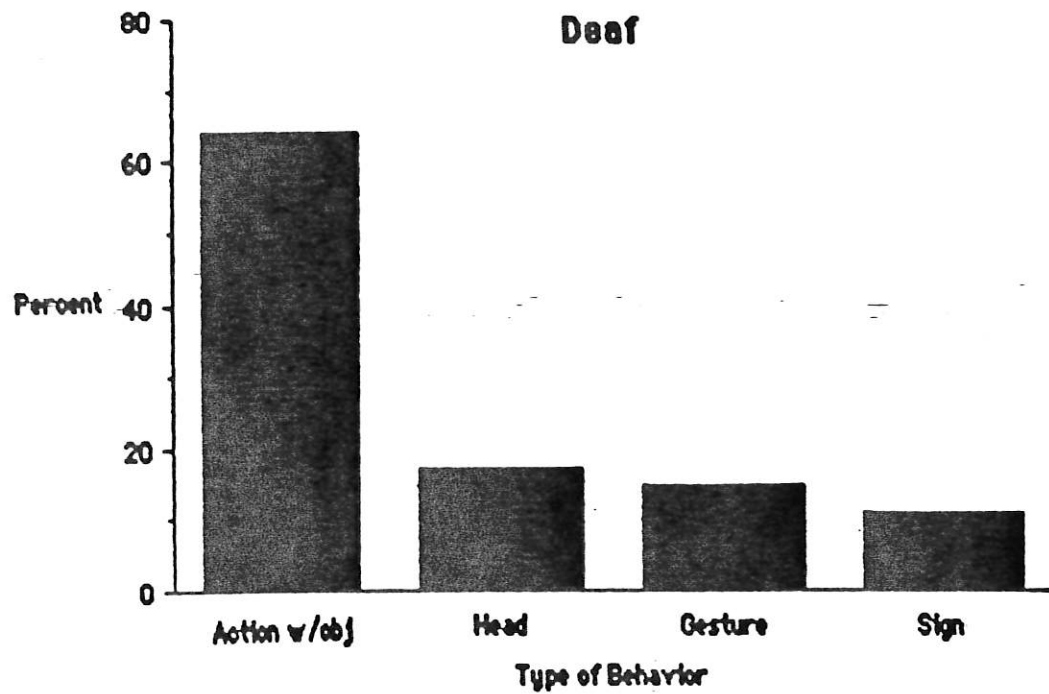


FIGURE 3

Comparative development of signs and gestures (age: 10 to 30 month)

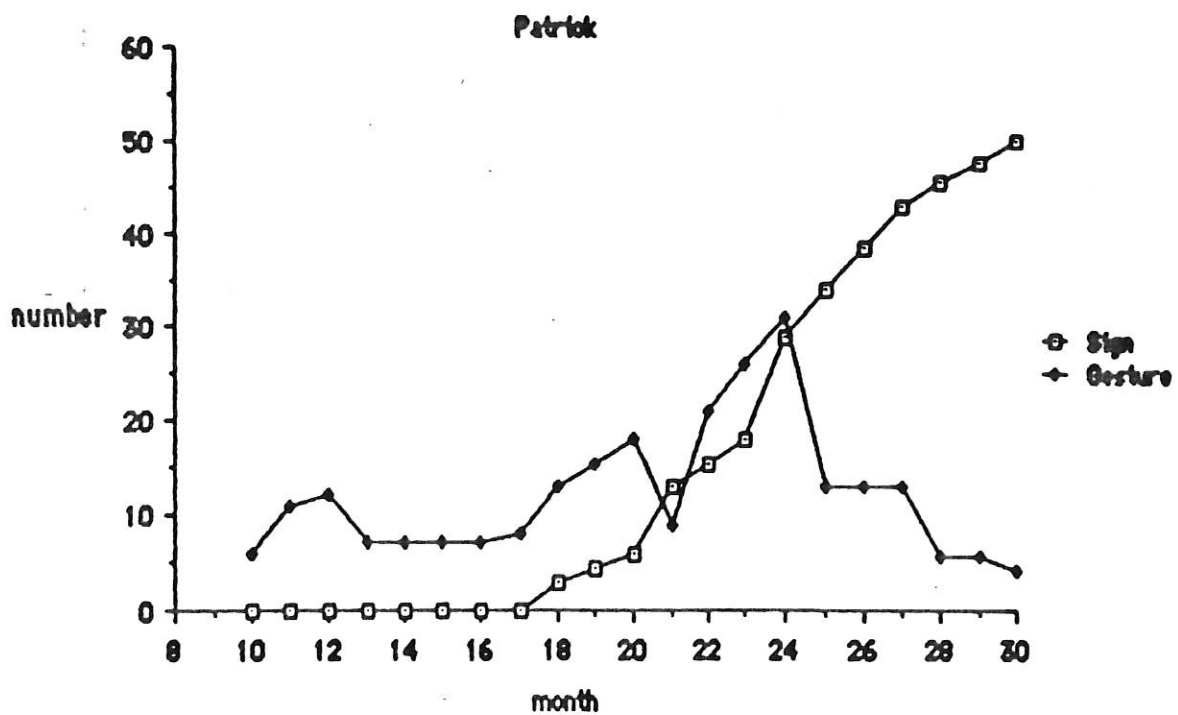
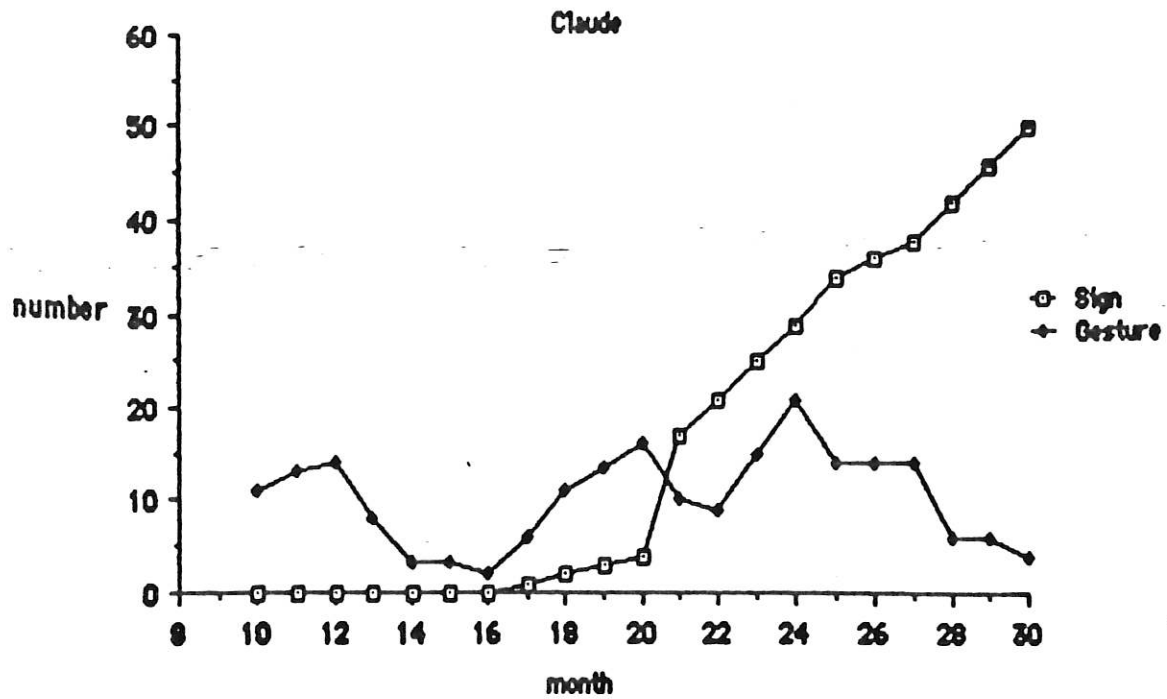


FIGURE 4