DOCUMENT RESUME

ED 041 253 24 AL 002 413

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TITLE Who is "Dada?" Some Aspects of the Semantic and Phonological Development of a Child's First Words.
INSTITUTION National Laboratory on Early Childhood Education, Syracuse, N.Y. Research and Development Center.
SPONS AGENCY Department of Health, Education, and Welfare, Washington, D.C. National Center for Educational Research and Development.
BUREAU NO BR-7-0706
PUB DATE [70]
CONTRACT OEC-3-7-070706-3118
NOTE 21p.

EDRS PRICE EDRS Price MF-$0.25 HC Not Available from EDRS.
DESCRIPTORS *Child Language, Cognitive Development, *Language Development, Phonology, *Psycholinguistics, *Semantics, Verbal Development, Vocabulary Development

ABSTRACT

When sound takes on meaning for the first time in the life of a child, a giant and prototypic step in the development of his symbolic capacities has taken place. This step is worthy of careful scientific scrutiny. This paper seeks first to describe the steps by which the author's child discovered the existence of meaning in sound, and second, to describe the successive structurization and progressive refinement of this first word, as well as related lexical terms. It seems that once the predictive value of a word has been established by confirmatory events, it need not be retested each time the word appears. This is perhaps a first step towards the ability to make meaningful linguistic reference in the absence of a concrete, physical referent. This process, whereby language becomes increasingly independent of external events, will be carried even further when words come to be combined in sentences. At that point the semantic burden begins to shift from situational to linguistic context in both comprehension and speech. The combinatorial possibilities inherent in sentence formation yield that creative productivity which is the hallmark of the later freedom of language from external control. Thus, there is a striking developmental shift from outer to inner control of understanding and speaking. [Not available in hard copy due to marginal legibility of original document.] (Author/AMM)

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The research or work reported herein was performed pursuant to a contract with the Office of Education, U. S. Department of Health, Education, and Welfare through the Syracuse Center for Research and Development in Early Childhood Education, a component of the National Laboratory on Early Childhood Education, contract OEC-3-7-070706-3118.

WHO IS "DADA?": Some Aspects of the Semantic and Phonological Development of a Child's First Words

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When sound takes on meaning for the first time in the life of a child, a giant and prototypic step in the development of his symbolic capacities has taken place. This step is surely worthy of careful scientific scrutiny. The present paper seeks first of all to describe the steps by which the author's child discovered the existence of meaning in sound and, second, to describe the successive structurization and progressive refinement of this first word, as well as related lexical items.

The Development of a Word-Referent Association and a Phonological Category

Lauren, a girl, produced "Dada" for her first word. We (her mother and father) started helping her to understand what these syllables meant to the point when they began to appear frequently as a spontaneous sound pattern. This point of spontaneous articulation was also identified by F.H. Allport (1924) as a first step in the development of language proper and a necessary preliminary to imitating the speech sounds of others.

In Stage I (Lauren was eight and one-half months old), we successfully encouraged her to imitate the sound at will. Basically, we started by imitating her. This procedure seemed to provoke her to repeat her original sound. We would, of course, act pleased when she did this, but it seems that the important factor was learning that if she said a sound, we would say it. Indeed, Piaget (1962) has described this same phenomenon in great detail.

In Stage II we began to help Lauren learn what this sound pattern meant. First, we promoted an association between the person of her father and the word "Dada" by having him be the sole person to utter "Dada." This training lasted for three days. During the first two days, we kept track of the total frequency with which Lauren looked at her father when she said "Dada." Thus, visual attention, the orienting response, was our index of comprehension. This count was very difficult to make both because it interrupted our normal activities and because "Dada" was often repeated a number of times in an echoic series. The latter problem was met by counting each series of repetitions as a single occurrence of the word. We looked at the proportion of times saying "Dada" accompanied looking at "Dada," both when the sounds were said spontaneously and when they were said imitatively. These counts were crude, it must be remembered, but the results were interesting and suggestive.

On the first day, when Lauren said "Dada," both spontaneously and in imitation, she failed to look more often than she looked at her father. When Lauren imitated "Dada," she looked at her father three out of seven times. The absence of visual orientation was much more marked when the sound was said spontaneously. Thus, the behavior of looking seemed to indicate a quantitative shift toward referential psychological meaning of the phonemic entity "Dada." Lauren's pattern of attention indicated that word and action (if not thought) were drawing nearer one to the other.

Equally interesting, these data suggest that word was more closely tied to action, sound to meaning, when the utterance has an external source --

that is to say, when it was spoken in imitation rather than spontaneously. I tentatively conclude that meaning is first imposed on sound from the outside and that spontaneous utterances only gradually take on meaning. If this description holds, then meaningful speech has not only a truly social origin but also a crucial period of complete dependence on other people's verbal behavior. In this view, spontaneous utterances are, at the beginning, play with sound. This idea will be taken up again.

I return now to a chronological account of the study. For the next six days we shifted our instructional procedure: I would say "Dada" to signal to Lauren her father's forthcoming appearance. I would say "Dada" and her father would appear. On the third day, she once turned to look at a man other than her father when asked "Where is Dada?" (Dada was in fact there). In the light of the results of later testing, this occurrence is taken as an indication that the sound-meaning connection had not yet been completely formed. Two days later I tested Lauren's comprehension of the word "father" systematically. This was accomplished by my saying different double syllables with father present and noting whether or not Lauren turned to look at him. At this point, Lauren was eight and three-fourths months old.

The first time we tested her, different combinations of the initial consonant phonemes /m/, /b/, /d/, and /t/ were tried with vowels /a/, /u/, and /ai/ to yield the combinations[1] "Mama," "Baba," "Dada," "Tata," "Bubu," "Dudu," and "Bye-bye." All sound entities containing the /a/ of "Dada" elicited an orienting response toward father, almost always with a

spoken "repetition" on Lauren's part of the word "Dada." The only syllables without the /a/ were "Bye-bye" (/bai-bai/), "Bubu," and "Dudu;" none of these elicited the orienting responses. "Dudu," the most similar of these to "Dada," did, however, bring forth a "Dada" from Lauren, although she did not turn to look at her father. The order of the stimuli and Lauren's responses to them are found in Table 1.

Insert Table 1 about here

The next day, the same pattern held at first, except that "Bye-bye" caused Lauren to look toward her father one of the two times that it was said. Note that "Bye-bye," unlike "Bubu," does have a vowel phoneme in common with "Dada." As before, she looked towards her father when I said "Dada" but not when I said "Mama" (twice). The next trial utilized the double syllable "Papa," and she did not look at her father. After this, I called "Dada" and her father appeared from behind the door. Lauren laughed and we did this three more times. (The smile seemed to indicate the presence of a confirmed expentancy. I infer that the word "Dada" had made her expect her father to appear. This influence is partly based on Kagan's (1966) evidence and my own observations that the smile signifies subjective recognition of a cognitive accomplishment.) I now repeated a variety of double syllables, including "Gogo" and "Mama." She made no mistakes. I smiled when she correctly identified her "Dada." By the end of the testing session she was saying "Dada" as well as turning to look at him when "Dada" was said.

This description constitutes evidence that at least two processes occur in the genesis of the first meaningful word: 1) strengthening of the association between sound-pattern and thing, as evidenced by the increasing correlation between sound and orienting response and 2) a narrowing of the phonetic category that can elicit this response. This first process appeared primarily on the production side: in the beginning, "Dada" was said without meaning (first spontaneously, then in imitation); gradually it became a signal to look at father. The second process (perhaps overlapping the first, perhaps, succeeding it, but in any case extending beyond it in time) took place on the comprehension side: not only "Dada" but also other double syllables functioned as a signal to look at father. Then the phonetic category constituted this signal narrowed down, finally to include only "Dada." Once these two processes -- association and phonological categorization -- were complete in the sense that "Dada" -- and only "Dada" -- would dependably elicit an orienting response from Lauren to her father, I began to study her categorization of referents. These two processes, the delineation of phonetic and of referential categories, comprise two of the components named by Roger Brown (1958) in his description of "The Original Word Game."

Referential Categorization: The Growth of Semantic Markers

In this part of the study, the question, in Fodor and Katz' (1963) terms, concerned the structure of Lauren's dictionary and how this structure was manifest in its initial entries. Fodor and Katz place this task outside the bounds of the semantic component of a general linguistic theory, although

they specify the form which dictionary entries are to assume. In their theory, meaning is limited to what can be obtained from the linguistic context. McNeill has also observed this constraint in dealing with the semantics of negation in the speech of a two-year-old Japanese girl (McNeill and McNeill, 1967). But, obviously in describing the origins of the semantic system, one begins at a point where there is no linguistic context. Indeed, there is no ready-made dictionary. One is forced, therefore, to look at verbal-extraverbal relations if one is to understand or to analyze the semantic structure of a child's first meaningful utterance.

If one assumes that child language tends toward the adult model (an assumption fruitfully employed in Piaget's research and recent studies of syntactic development), then one can use the semantic markers found in the standard adult dictionary as a basis for the description of the child's system of meaning. According to linguistic intuition (my own) and the Random House Dictionary of the English Language (1966), "father," of which "Dada" is the baby-talk form, has three principal semantic markers: male, parent, caretaker. Utilizing McNeill's (1967) way of representing semantic dimensions, one can define a whole domain of related words in terms of the three dimensions implied by these markers. The three dimensions would be: male-female, parent-unrelated person, caretaker-noncaretaking person. Again, following McNeill, I organize the dimensions into a cube and place relevant words at appropriate corners.

Insert Figure 1 about here

The cube indicates that there are three classes of referents which are semantically possible but nonexistent in Lauren's world. These are indicated by zeros and consist of the following combinations of features: 1) noncaretaking male parent, 2) noncaretaking female parent, 3) unrelated male caretaker. (The remaining two corners represent existent classes of people but classes that did not yet have verbal labels at the time when this study ended. They are, in a sense, wastebasket categories and are as follows: 1) noncaretaking unrelated male, 2) noncaretaking unrelated female.)

Certain relationships may be easier to see if the terms under discussion are placed in a feature matrix. Once more I utilize McNeill's mode of representing the semantic space and arrive at the matrix presented in Table 2.

Insert Table 2 about here

Now, patterns of confusion will be utilized to study the construction of the above cube. Like the McNeills, I have looked at which terms replace others and have thus tried to determine whether and in what order the semantic dimensions emerge.

As soon as "Dada" was dependably established in Lauren's vocabulary in the manner described above, I tried to ascertain its semantic content by testing for generalization along the different dimensions described. It seemed clear that, initially, the meaning of "Dada" for Lauren was caretaker

The first piece of evidence for this conclusion was that when we tried to teach her "Mama" by associating my entrance with the word, she would often respond with "Dada." More convincing evidence, as it is on the comprehension rather than production side, was Lauren's orienting response to Barbara (her babysitter and member of our household), when a frequent male visitor asked "Where is Dada?" This test was done twice, both times with positive results, about three weeks after she had learned the referent for "Dada." She also turned to look at Barbara twice when I asked "Where is Dada?" (Her father was not present.) She did not, however, turn to look at any other man when asked "Where is Dada?" no matter how familiar these men were. I tried this test once each with two different men. Thus, "Dada" appeared to mark all caretakers and set them apart from non-caretakers. Clearly, the standard dimension of sex was absent -- witness the extension of "Dada" to female caretakers; the parent-nonparent distinction was also missing, as Lauren's application of "Dada" to her babysitter indicates.

About a week after "Dada" was initially established, we started to try to establish "Mama" in the same way -- by using it as a signal for my appearance, etc. Perhaps for this reason, Lauren appeared to have generalized "Dada" more to her babysitter than to her mother when tested about two weeks after the "Mama" training had begun.

It was predicted that once the word "Mama" was introduced into Lauren's semantic system, it would be generalized to Barbara. In other words, the opposition "Dada" - "Mama" would indicate the existence of a

male-female distinction. Two days after the above test, Lauren's father asked about "Mama" with both her mother and her babysitter present; she turned to look at her babysitter. (She also looked at her and spontaneously said "Mama.") Thus, the predicted generalization did in fact occur. Why Lauren looked at her babysitter rather than her mother when both were present is a bit puzzling, however. At this point, then, the only missing distinction or dimension appeared to be the parent-nonparent one.[2]

Twelve days later, Lauren's father again tested to see if Lauren would orient toward Barbara at the word "Mama" when "Mama" was absent. This time the results were ambiguous. Two days later I tested to ascertain if this seeming reduction of generalization was due to the emergence of a separate word to denote Barbara. (We had not tried to teach her "Barbara," although Barbara had.) Indeed, Lauren did seem to know who "Barbara" was, again using an orienting response as the criterion of comprehension. This test was only made once, but the acquisition of "Barbara" was confirmed on subsequent occasions. Lauren responded either to "Barbara" or to "Baba." Her pronunciation, however, was invariably "Baba."

Two weeks after "Barbara" was first noticed as an item in Lauren's vocabulary of comprehension, she was observed to generalize this word to other women. When visiting a female friend, Lauren spontaneously looked at her and said "Baba." When I then asked "Where is Barbara?" she again turned to look at her. The reaction occurred more than once; at one point, she even seemed to say "Babwa" while looking at this lady. On a latter occasion she seemed spontaneously to call yet another woman "Barbara."

An interesting sidelight on the matter of phonological categories -- Lauren was already waving and saying "Bye-bye" at the time she was learning "Baba." At this point "Bye-bye" temporarily disappeared. It was as though "Bye-bye" and "Baba" were in the same phonemic class and therefore could not function as two different words. To the question "Could they not be homonyms?" the answer most likely is that homonyms can exist only where context sets them apart. But at this stage there is no linguistic context; there are only isolated words. Therefore, if homonyms are to be formed, it must be on the basis of distinctive situational contexts. It was unlikely, however, that the extralinguistic contexts, that is, the settings for "Baba" and "Bye-bye" were actually in complementary distribution. For example, when Lauren and Barbara would part, Barbara's utterance "Bye-bye" would be situationally ambiguous. In any case, "Bye-bye" as a signal to wave did not return until a number of weeks later.

Presumably the appearance of "Barbara" meant that the third semantic dimension, parent-nonparent, had appeared, for this was the only distinction between "Mama" and "Baba." I hypothesized that "Baba" had three markers: nonparental female caretaker. The extension of "Barbara" to other women belies precisely this interpretation, however, because these other ladies were noncaretaking persons. An interpretation consistent with this fact is that, of all currently available terms, this word with its particular semantic markers came closest to fitting the class of nonparental noncaretaking females.

This account is consistent with Lauren's later generalization of "Dada." When she was in her twelfth month, she was observed to look at strange men and say "Dada." I further tested her extension of "Dada" to men in general by asking her about "Dada" in the presence of a fairly unfamiliar man when she was about eleven and three-fourths months old. She responded by turning towards him and saying "Dada" herself. A man like this was neither parent nor caretaker, yet at that point in time "Dada" was the only term in Lauren's lexicon to contain a "male" marker. The word "Baba," of course, could have been used with as much semantic accuracy as "Dada" to denote strange men, since it too contains one appropriate marker -- nonparent. The fact that "Dada" was chosen instead is however, consistent with the development priority of the male-female distinction over the parent-nonparent. In fact, it is hard to see what Lauren's basis for making the parent-nonparent distinction could have been, although there are a variety of possible cues. Nevertheless, the fact that "Baba" and not "Mama," was the term generalized to strange women indicates the psychological reality of this parent nonparent dimension.

The extension of "Dada" to all men is a common observation (for example, Piaget, 1962). Lauren's semantic development makes clear, however, that this is but one stage and certainly not the first, in the dynamic growth of a fairly complex classificatory system.

There is some evidence that the words "Mama" and "Baba" were confused after both were present. At least part of the confusion would seem to have had a phonological basis. At the age of eleven months, Lauren would

say "Baba" in clear imitation of "Mama", thus indicating the absence of the nasal-oral distinction in speech. At this point, she probably confused /m/ and /b/ perceptually at least some of the time, thus sometimes failing to distinguish "Mama" from "Baba."[3] If so, then the parent-nonparent distinction was not totally established and "Mama" and "Baba" were used interchangeably to denote female caretakers. This hypothesis is consistent with the available evidence and explains why "Mama" was more than once applied to Lauren's babysitter rather than to her mother, who was also present. This lexical situation also makes sense in terms of Lauren's world, for Mama and Barbara did appear to be functionally interchangeable not only in terms of physical caretaking but also as far as Lauren's feelings were concerned.

By eleven and three-fourths months Lauren could say both "Baba" and "Mama" and seemed to apply them correctly. From eleven months on, it became increasingly difficult to elicit an orienting response with the words "Dada," and "Mama," and "Baba." Lauren's boredom seemed to follow the mastery of a particular reference of a particular word. At this satiation point, her use of her words in speech appeared suddenly more advanced; this is a fairly subjective impression, however. This decrease in orienting behavior, while making the study more difficult, is, nevertheless, in accord with the results of a Soviet experiment concerning the speech comprehension of children of this age: objects whose names are unknown will elicit a much stronger orienting response than others whose names are already familiar (Mallitskaya, 1960). That pattern agrees with

the results reported here. Indeed, the internalization of the earliest word meanings appears to have occurred: it is now possible to "understand" a sound pattern without necessarily turning to look at its referent. It seems that once the predictive value of a word has been established by confirmatory events, it need not be retested each time the word appears. This is perhaps a first step towards the ability to make meaningful linguistic reference in the absence of a concrete, physical referent. This process, whereby language becomes increasingly independent of external events, will be carried even further when words come to be combined in sentences. At that point the semantic burden begins to shift from situational to linguistic context in both comprehension and speech. The combinatorial possibilities inherent in sentence formation yield that creative productivity which is the hallmark of the later freedom of language from external control. Thus, there is a striking developmental shift from outer to inner control of understanding and speaking.

A note on the relationship between comprehension and production. My observations extend those of Ruth Weir in Language in the Crib (1962) to a much earlier age, for Lauren always played a lot with the words she was learning, as well as with other sounds. I call it word "play" because external referents were absent. Much of this play did, in fact, occur in the crib. Where no external referent is present, one can assume that the word has no meaning at the moment for the very young child. The situation is psychologically the same as that described above wherein the child, before he has mastered a given word, utters it but does not look at a concrete referent.

There, however, the referent is absent for the speaker although not absent in fact. This phenomenon of "meaningless" speech can be taken as evidence in favor of Vygotsky's (1962) notion that thought and speech develop in parallel streams and only gradually come together. The gradual coordination of saying with looking, described above, is striking evidence on this point. In applying Vygotsky's ideas about thought and speech to the stage of language development depicted here, I take comprehension to be the "thought" side of language. It is for this reason that I have studied semantic development mainly in terms of comprehension. For at an age when speech showed a playful quality and little consistent relation to the outside world, understanding proved to have a quite regular pattern. Comprehension and speech were for the most part still following separate, if parallel, paths. But it is plain that comprehension is carrying the burden of the child's linguistic competence at this time.

The preceding analysis is truly a tentative one. The findings certainly need to be confirmed with other vocabulary acquisitions and with other children. Perhaps this description, as much by its lacunae as by anything else, will suggest some problems in semantic and phonological development and some methods of attack.

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FOOTNOTES

This study was supported by a subcontract from the University of Illinois to the Research and Development Center in Early Childhood Education under a contract with the Offices of Education OEC 3-7-070706-3118.

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[1]The spelling here, as for all other words, is that of common English orthography; its translation into a phonemic representation is simple if desired. Phonemic notion (/.../), where it occurs, follows the system of Jakobson, Fant, and Halle (1967).

[2]In concluding the presence of a male-female distinction, I am assuming that Barbara stopped being "Dada" when she started being "Mama."

[3]The possibility of this hypothesis was later reinforced by Lauren's parallel confusion between "Nana" and "Dada" in her own speech. After having referred to bananas as "Nana" for some time, she suddenly started calling them "Dada." Like the phonemes /b/ and /m/ in "Baba" and "Mama," /d/ and /n/ are identical save for the feature of nasality.

TABLE 1

Testing Procedure for Comprehension of "Dada" - First Day

Stimuli (in order of presentation)	No. of times presented	No. of times turned toward father
Dada	2	2
Mama	2	2
Bye-bye	2	0
Baba	1	1
Dada	2	2
Tata	1	1
Bubu	1	0
Dudu	2 (or more)	0
Bubu	2 (or more)	0
Dada	2 (or more)	2 (or more)

TABLE 2

Semantic Feature Matrix for "Dada" and Related Words

	"Dada"	"Mama"	"Barbara"
Male	+	-	-
Parent	+	+	-
Caretaker	+	+	+

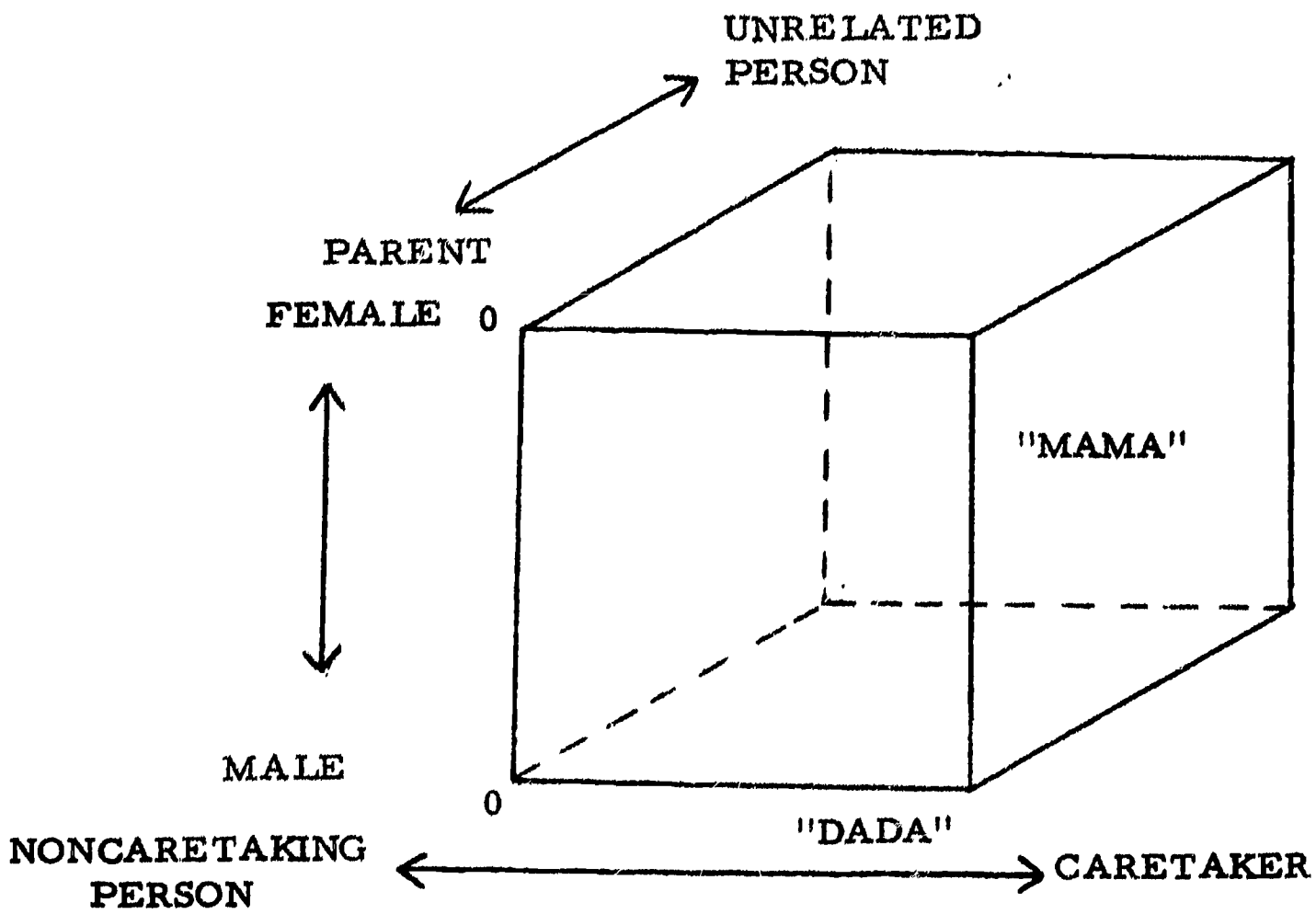

Fig. 1 "Dada" and related words located in semantic space.