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SEMANTIC REALITY OF BANTU NOUN CLASSES: THE KIKUYU CASE[1]

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Bantu noun classes, although primarily syntactic categories, may have some semantic properties. For example, Leakey has suggested that several Kikuyu noun classes can be rank ordered along an evaluative dimension. It does not appear to be possible to define semantic rules for noun class membership. However, noun class may affect judgments which people make of the semantic similarity of words. In the present paper we use the method of triadic comparisons to assess the degree to which this kind of effect occurs.

1. Introduction

In this paper we are concerned with the nature and extent of the semantic reality of a syntactic category in Bantu languages: the noun class. We investigate the problem by means of a psycholinguistic experiment, using a set of words from Kikuyu.

In Bantu languages, every noun belongs to a noun class. These classes are much more numerous than the genders of Indo-European languages; there are as many as 22 noun classes in some classification systems for Bantu languages. Noun classes correspond with noun prefixes: the members of a given noun class take one of a small number of prefixes, and a given noun prefix is found in only a small number of noun classes. Prefixes for adjectives, pronouns and verbs are

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also determined by noun class membership; the rules governing these prefixes are called concordance rules. Bennett [1970], writing about Kikuyu, defines a noun class as a set of nouns which share a concordance pattern of adjective, pronoun, and verb prefixes. Examples of concordance from Kikuyu may be helpful at this point:[2]

(1) Class 7

kihaato kiega	'a good broom'
kihaato kingi kiega	'another good broom'
kihaato giakwa kiega	'my good broom'

Class 11

ruhiu ruega	'a good sword'
ruhiu rungi ruega	'another good sword'
ruhiu ruakwa ruega	'my good sword'

The syntactic function of Bantu noun classes is clear; less obvious is the semantic status of noun classes. Linguists express conflicting opinions concerning the semantic reality of noun classes. Welmers, for example, speaks of a "partial semantic correlation" [1973:159], while Hoffmann asserts that "noun classes are only morphological categories and void of any meaning whatsoever...." [1963:169]. These discussions of the meaning of noun classes have focused on distributions of meaning across syntactic categories. Failure to find exact correspondence between sets of *denotata* and syntactic categories has led investigators such as Hoffman to deny that noun classes have meaning.

In one approach to the problem, the semantics of syntactic categories is determined by observation of the distribution of real world phenomena, such as objects, across syntactic categories: if observable phenomena correspond fairly consistently with syntactic categories, it is easily concluded that the syntactic category has meaning; the semantic status of the category is then described by the observed patterns of distribution of words across syntactic categories. This

[2]Throughout this paper, we will use Bennett's system for numbering Kikuyu noun classes [Bennett 1970]. We will also deal only with singular forms.

approach is exemplified by Mathiot's study of Papago noun classes [1962] and by Carroll and Casagrande's study of Navaho and Hopi verbal categories [1958]. Mathiot found correlations between Papago noun classes and the location of words for plants and animals in a folk-biological taxonomy. Carroll and Casagrande discussed Navaho verbal classes in terms of the shape of the physical object to which one is referring.

In the case of Bantu languages, however, foreign investigators do not seem to be able to formulate systematic interpretations of observed distributional patterns. To our knowledge, Leakey has produced the most complete description of meanings of a Bantu noun class system. Leakey, a fluent speaker of Kikuyu from childhood, suggests that several of the noun classes are rank ordered. To take a few examples from Leakey's system:

(2)

Class 1:	primarily human
Class 3:	most large trees and plants
Class 9:	most living things not included in class 3
Class 7:	primarily inanimate objects
Class 5:	objects or beings with supernatural significance
Class 11:	"The connecting link which unites all words in this class is a somewhat strange one, and that is the concept of undulation. Many words come into this class which, at first sight, seem to have no connection at all with other words in the same class, and yet investigation will always reveal this concept, even if only in a limited part of the use of the word." [Leakey 1959:15]. Examples cited by Leakey of class members are river, rawhide, wind, tongue, whirlwind, dust (by extension of whirlwind), wooden wand, bat ("because of the way it flies"), and fighting sword ("which traditionally has a wavy edge").
Class 13:	diminutiveness

There are exceptions to the rules, however, which serve to elevate or demote objects, so that one cannot know the class to which something belongs simply by knowledge of the above rules. A person, for instance, can be demoted to a lower class for the purposes of insult or expression of hatred:

(3) mundu 'person'
kindu 'thing'
kirimu 'fool'
gitonga 'miser'

Similarly, spirit-borne diseases are often promoted to class 3 (mutungu 'smallpox') along with some unusually important animals (muruthi 'lion'); a person may be placed in class 5 to indicate his spiritual significance (ithe 'father'); and an object may be a member of its class due to its association with another object in that class rather than to its own nature or form. (Examples from Leakey [1959]). Abstract nouns, in this system occur in at least two classes, humans in several classes, diseases in at least two classes, and so forth. With Leakey's analysis of Kikuyu, then, objects sometimes belong to noun classes by virtue of criteria which would be easily observable by the foreign investigator (such as their morphology), but some reasons for assignment to a noun class must be understood in terms of criteria which can be discovered only through a thorough knowledge of both the language and the belief system. An example from Kikuyu is 'lion', which has been elevated in noun class, according to Leakey, because it is felt to be a superior kind of animal. An outsider cannot look at a lion and decide by some feature such as shape, size, or biological taxonomy that it is an exalted creature. Hence, words are assigned to noun classes partially by the qualities of being which they have. In this sense, one meaning of the noun class is the rank ordering in qualities of beings. This involves an evaluation which is culturally learned.

A parallel analysis by Hale [1973] also discusses the possibility of evaluative rank ordering of syntactic categories along a semantic dimension. He shows that Navaho nouns are ranked in three classes (reference to people, animate, and inanimate, along an implicit continuum of degree of animateness) and that this rank ordering is necessary to an understanding of subject-object inversion, a purely syntactic phenomenon.

In this study we will not attempt to validate Leakey's interpreta-

tions of Kikuyu noun classes, but we will attempt to show that the noun class categories do have a semantic significance. Since in the case of Kikuyu we cannot rely on etic patterns such as shape or biological relationship in judging whether two noun classes are semantically distinct, we conduct a psycholinguistic experiment in which we allow Kikuyu respondents themselves to judge whether the members of different noun classes are semantically distinct. The present approach differs from most previous research in that it has heretofore been the foreign linguist who makes the judgment about the semantic status of syntactic categories, by looking for patterns which he himself can see in the distribution of words across the syntactic categories; in the present study, Kikuyu respondents themselves do the patterning through their responses to a triads test. With this triads test, we focus on the question of whether or not noun class membership has an effect on Kikuyu classification of nouns on the basis of meaning.

Before we describe the present experiment, it will be useful to discuss two previous experiments concerned with the semantic reality of syntactic categories. These experiments were conducted by Ervin [1962], who studied connotative meanings of Italian genders, and by Carroll and Casagrande [1958], who studied the effects of Hopi and Navaho verbal forms on classification of a) actions and b) physical objects. Ervin obtained ratings on four scales for nonsense words to which had been added masculine or feminine affixes. The scales, reminiscent of semantic differential items, were good/bad, pretty/ugly, big/little, and strong/weak. Ervin found that words with feminine affixes were more likely to be judged pretty, weak, good, and little than were words with masculine affixes. Ervin's study differs from our approach in the use of semantic differential scales rather than triads, with the consequent emphasis on connotative meanings. Carroll and Casagrande, using the method of triadic comparisons, found that Navaho verbal categories had a measurable effect on the behavior of children who were asked to sort physical objects. Navaho verbal stems are determined by the physical shape of the object of the verb. Carroll and Casagrande reasoned that the linguistically-determined necessity of making frequent classifications of objects on the basis of shape should lead Navaho

children to classify physical objects on the basis of shape rather than color. They presented two groups of children with a set of critical triads of physical objects: for each triad the children could classify the objects either on the basis of shape or on the basis of color. The first group, consisting of Navaho-language dominant Navaho children, tended to classify on the basis of shape more frequently than did the second group, which consisted of English-language dominant Navaho children. Carroll and Casagrande's research strategy is similar to our own, which also uses critical triads; it differs in focusing on the classification of physical objects rather than on the classification of words.

2. The Triads Experiment

The present experiment focuses on a domain of words to which we refer as "flying animals", which contains five words from class 11, three words from class 9, and one word from class 5. The words listed in (4) are used as stimuli in an experiment using triadic comparisons.

(4) Words Used in the Triads Test

	Kikuyu	English gloss	Noun class
1.	ruhuhu	'bat'	class 11 (undulation)
2.	ruigi	'hawk'	"
3.	ruoya	'feather'	"
4.	ruagi	'mosquito'	"
5.	ruruto	'preying mantis'	"
6.	nderi	'vulture'	class 9 (animals)
7.	ngi	'housefly'	"
8.	ndahi	'grasshopper'	"
9.	ithagu	'wing'	class 5 (ritual)

In triadic comparisons, stimuli are presented to the respondent three at a time. For each triad, respondents were asked to select from the three stimuli the one most different in meaning from the other two. A triads test typically consists of a number of such items, chosen to make systematic similarity comparisons within a set of stimuli. Triads tests have been used extensively in cognitive anthro-

pology using verbal stimuli [Romney and D'Andrade 1964]. A standard triads test uses all possible triadic combinations of the words which comprise a semantic domain. Since time considerations did not permit presentation of all possible triads using the nine stimulus words, we focused primarily on triads which would provide critical information about the hypothesis that noun class affects semantic classification. An example of such a triad is the following:

(5) ruigi 'hawk', ndahi 'grasshopper', ruruto 'preying mantis'

For this triad, two words (hawk and preying mantis) belong to the same noun class and another pair of words (grasshopper and preying mantis) are similar in western biological taxonomy. Thus, each person had a choice between classification on the basis of noun class membership and classification on the basis of biological similarity. Using several such critical triads, we can measure the degree to which the two classificatory principles are followed.

In addition to the critical triads, the test included triads whose purpose was to ensure that ample information was provided about the relative similarities of all of the pairs of words in the domain. This was accomplished by requiring that each pair of words be found together in at least one triad. The total test contained 46 triads. The test was administered[3] by a Kikuyu research assistant to 33 Kikuyu

[3]Respondents were instructed in Kikuyu to sort words by the images which the words brought to mind. Instructions were worded in this way to discourage respondents from sorting on the basis of phonology. This precaution seems to have been effective in avoiding phonologically-based sorting, as the triads data contradict the hypothesis that sorting was done on the basis of the sounds of the words. Although the words ruigi and ruagi (hawk and mosquito) are phonologically very similar, they are judged to be similar in only 12.6% of triads in which they are included (25 out of 198 choices). By contrast, nderi and ngi (vulture and housefly), which are phonologically less similar, are judged to be similar in 24.2% of triads in which they are included (40 out of 165 choices). If there remains any doubt concerning the possibility of phonologically-based sorting, this can easily be tested with a triads experiment including words which belong to the same noun class,but which are phonologically divergent.

with no more than three years of schooling.[4] Respondents were chosen so as to be evenly distributed across age and sex categories. All testing was done in September, 1973 in the community of Ngecha, Kiambu district, Kenya.

Responses to the triads test were analyzed using two models: (a) hierarchical clustering analysis,[5] and (b) analysis of choices within minimal contrast sets.

3. Results

In this section we examine the cognitive organization of the verbal stimuli used in the triads test. Here we show that although noun class is not a major feature in the overall hierarchical organization of the concepts, it appears clearly as a feature within small contrast sets.

We began our analysis by examining the results of the hierarchical clustering of the triads responses. The cluster analysis required a measure of similarity among words. This was obtained from the triads responses. For example, ithagu 'wing' and ngi 'housefly' occurred in a triad with ruagi 'mosquito'. Seven out of 32 people chose ruagi as most different. By so doing, they judged ithagu and ngi to be similar. Thus, the similarity measure for ithagu and ngi was 7/32. If a pair of words occurred in more than one triad, we took the average of the similarities for the triads in which the pair occurred.

The diagram in (6) is the outcome of a hierarchical clustering analysis of the triads test data.

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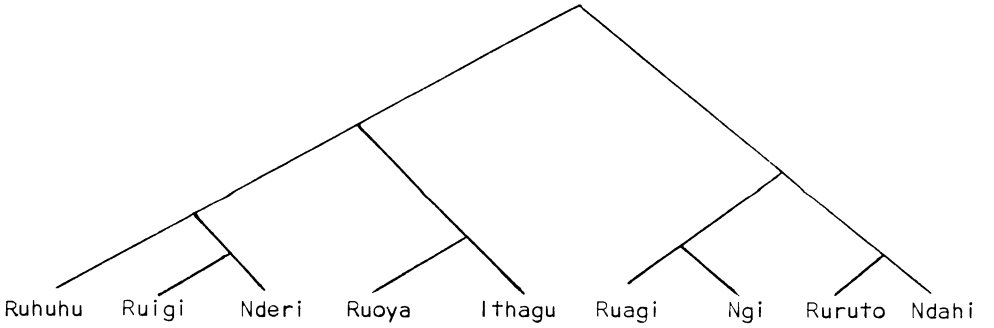
[4] We imposed this restriction on education to avoid contamination by English-language bilingualism. Through extensive pretesting, we found that nonliterate informants understood the test instructions and the nature of the task, and gave meaningful responses.

[5] We use the all-possible pairs method of cluster analysis [D'Andrade n.d.], which builds a tree structure from the bottom up: first the two most similar words are merged together into a cluster; then the next most similar words or clusters are merged. This process continues until the top-most node of the tree structure has been connected.

(6) Hierarchical Clustering of Flying Animals Data



Number of taxonomic errors: 19

Number of correct predictions: 149

The structure of this diagram is straightforward. The first distinction contrasts insects with larger creatures 'bird, bat', and with the parts of the larger creatures 'wing, feather'. Among the insects, a size distinction contrasts 'mosquito' and 'housefly' with 'preying mantis' and 'grasshopper'. Within the non-insect cluster, the primary distinction contrasts the parts of the animals 'feather, wing', with the whole animals. 'Bat' is further distinguished from the two birds. There are five terminal categories in the hierarchical structure; the five members of class 11 are evenly distributed across these categories, so that no two are in the same category.[6] This structure, although consistent with a terminal distinction based on noun class, is not in itself evidence that sorting was done on the basis of noun class. Hence, we shall examine minimal contrast sets to test the hypothesis that noun class is a subsidiary semantic criterion, which operates only when taxonomic relationships are held constant.

[6]Another model for representation of the similarities data from the triads responses is multidimensional scaling [Shepard 1962; Kruskal 1964], which can detect some kinds of relationships among words which are not visible in a hierarchical model. Multidimensional scaling represents

A familiar case of the existence of subsidiary semantic criteria can be found among English kin terms. Romney and D'Andrade [1964] and Nerlove and Burton [1972] have shown that sex is the fourth and least salient dimension in classification of English kin terms. Pairs of kin terms which differ only on sex are more similar in meaning than any other pairs of kin terms. Thus, a taxonomy of part of the domain of English kin terms (lineals) appears in (7). The most important

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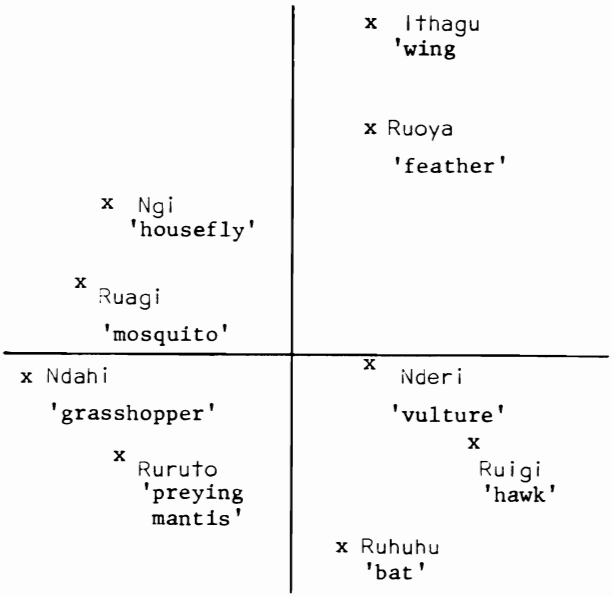
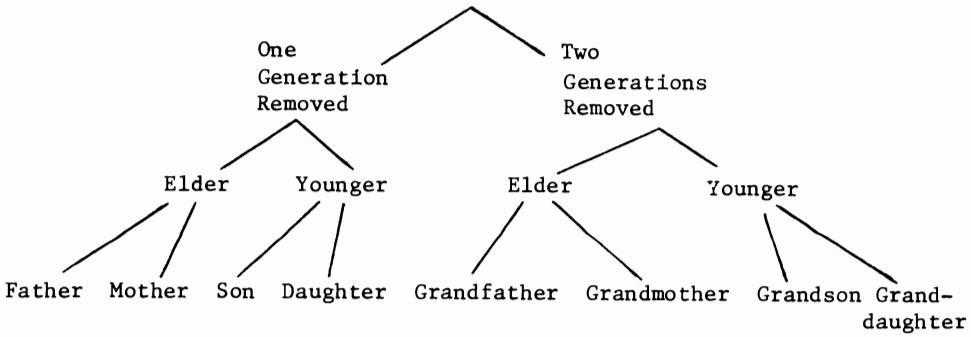
the words as points in a space of one or more dimensions, so that words which are similar to each other will be close together while words which are highly dissimilar will be distant from each other. The data were scaled in two dimensions, given in (6'):

(6') Multidimensional Scaling of Flying Animals Data



The multidimensional structure is consistent with the cluster structure, but shows some detail not visible from the cluster structure. In (6'), there are two interpretable dimensions. Dimension #1 contrasts insects with non-insects, and is identical with the first distinction of the cluster analysis. Dimension #2 is size: large insects, large birds, and the flying mammal are contrasted with small insects and parts of flying animals.

(7) Taxonomy of English Kin Terms



component distinguishes second generation kin from first generation kin. The next most important component distinguishes elders (father, mother, grandfather, grandmother) from younger kin (son, daughter, grandson, granddaughter). As with the present hierarchical structure for flying animals, where there is one and only one member of class 11 in each terminal category, the hierarchy for English kinship shows one member of each sex in each terminal category. Being speakers of English, we know that distinctions within the terminal categories of (7) are made on the basis of sex. However, were we not speakers of English, and were we presented with the data of (7), we would not necessarily know the basis on which the two members of each terminal category were distinguished. In other words, the taxonomy of (7) is suggestive but not demonstrative of the fact that sex is a distinctive feature in English. To demonstrate that sex is a distinctive feature for English kinship, we would have to examine paradigms contrasting sex with one other component at a time. An example of such a contrast set can be seen in (8).

(8) Minimal Contrast Set for English Kindship

	Male	Female
Elder	Father	Mother
Younger	Son	Daughter

Here there are four words which differ on only two components: age and sex. Within this paradigm all other dimensions of contrast are held constant. By asking people to make triadic comparisons among words

from within such a set, we would make it possible for them to attend to the sex distinction without being distracted by other more salient features. We could then count the frequency of triads responses which select as most different words which differ on the feature of sex. This would enable us to judge whether people attend to sex more than would be expected by chance.

The flying animals cluster structure of (6) is parallel to the English kinship cluster structure of (7): the hierarchical structure for English kinship has one member of each sex in each terminal category, while the hierarchical structure for flying animals has one member of class 11 and one member not of class 11 in each terminal category. Our lesson from the English kinship example of (7) and (8) would suggest, therefore, that it would be appropriate to look for evidence that noun class is treated as a distinctive feature in Kikuyu by examining the distribution of triads choices within minimal contrast sets.

By virtue of their contrast on features of size, noun class membership and phylogeny, the words in the flying animals test form two paradigms which are analogous to the paradigm for English kinship, in that they each contain minimal contrast on two features. Paradigm 1 is formed by contrasting noun class membership with size, for insects only. Paradigm 2 is formed by contrasting noun class membership with phylogeny, holding size constant. A third paradigm contains a minimal contrast on noun class, but contrasts at the same time two other features by including large birds and small insects. The paradigms are listed in Table 1, p 169.

Four different triads can be constructed using the four words within each paradigm, for a total of twelve triads among the three paradigms. These twelve traids provide a critical test of the effect of noun class, as they are based on minimal contrast of semantic features. All twelve of these triads were included in the test. An example is the triad in (9):

(9) ruagi 'mosquito', ruruto 'preying mantis', and ndahi 'grasshopper'

Table 1. Three Paradigms Containing Minimal Contrast on Noun Class

Paradigm 1. Large Insects vs. Small Insects

	class 11	class 9
Large Insect	ruruto 'preying mantis'	ndahi 'grasshopper'
Small Insect	ruagi 'mosquito'	ngi 'housefly'

Paradigm 2. Large Birds vs. Large Insects

	class 11	class 9
Large Bird	ruigi 'hawk'	nderi 'vulture'
Large Insect	ruruto 'preying mantis'	ndahi 'grasshopper'

Paradigm 3. Large Birds vs. Small Insects

	class 11	class 9
Large Bird	ruigi 'hawk'	nderi 'vulture'
Small Insect	ruagi 'mosquito'	ngi 'housefly'

'Mosquito' and 'preying mantis' share the feature of noun class. 'Preying mantis' and 'grasshopper' share the feature of size. Thus, respondents who attended to size would select mosquito as most different. It is also possible to attend to neither of these two features and select preying mantis as most different. For each of the twelve triads, one of the three choices corresponds to judgment on the basis of each of the two features. This has been done in Table 2. p. 171. Here we see that for paradigm 1, 38% of the choices were made on the basis of noun class, 44% on the basis of size, and 18% on the basis of other criteria. For paradigm 2, 37% of the choices were made on the basis of noun class, 54% on the basis of phylogeny, and 9% on the basis of other criteria.

For paradigm 3, we no longer have minimal contrast on size or phylogeny; rather, the two features interact. In this case, the percentage of choices made on the basis of noun class drops to 27%, as opposed to 50% made on the basis of size/phylogeny and 23% made on the basis of other criteria. Paradigm 3 is not as useful for detecting judgments on the basis of noun class as are paradigms one and two, as it does not contain minimal contrast on either size or phylogeny alone.

A statistical test verifies the effect of noun class on triads judgments. Summing the results for the three paradigms, we find that 194 out of 393 choices correspond to distinctions of size and/or phylogeny (49.4%). Taking these as given, we ask whether or not the remaining choices were done at random. Half of the remaining triads choices would correspond to the noun class distinction. Summing across the three paradigms, we find in fact that 133 choices (67%) correspond to the noun class distinction and that 66 (33%) do not. A Chi-square test on these data rejects the hypothesis that these 199 judgments were done at random ($X^2 = 22.56$, $p < .0005$). Thus, our triads data are consistent with the hypothesis that noun class has an effect on triads choices, but that the effect of noun class is subsidiary to the effects of distinctions of size and phylogeny.

Table 2. Frequencies of Word Choice* within the Twelve Critical Triads

Paradigm 1: Large Insects vs. Small Insects

	Noun Class**	Size	Other
	ruruto 'preying mantis'	ngi 'housefly'	ndahi 'grasshopper'
	17	5	11
	ndahi 'grasshopper'	ruagi 'mosquito'	ruruto 'preying mantis'
	6	21	6
	ruagi 'mosquito'	ndahi 'grasshopper'	ngi 'housefly'
	9	21	2
	ngi 'housefly'	ruruto 'preying mantis'	ruagi 'mosquito'
	18	10	5
Totals for Paradigm 1:	50 (38%)	57 (44%)	24 (18%)

Paradigm 2: Large Birds vs. Large Insects

	Noun Class**	Phylogeny	Other
	ruruto 'preying mantis'	nderi 'vulture'	ndahi 'grasshopper'
	9	21	3
	ndahi 'grasshopper'	ruigi 'hawk'	ruruto 'preying mantis'
	12	17	3
	ruigi 'hawk'	ndahi 'grasshopper'	nderi 'vulture'
	9	21	3
	nderi 'vulture'	ruruto 'preying mantis'	ruigi 'hawk'
	18	12	3
Totals for Paradigm 2:	48 (37%)	71 (54%)	12 (9%)

Table 2. (continued)

Paradigm 3: Large Birds vs. Small Insects

	Noun Class**	Phylogeny & Size	Other
	ruigi 'hawk'	ngi 'housefly'	nderi 'vulture'
	12	19	2
	nderi 'vulture'	ruagi 'mosquito'	ruigi 'hawk'
	2	22	9
	ruagi 'mosquito'	nderi 'vulture'	ngi 'housefly'
	9	12	11
	ngi 'housefly'	ruigi 'hawk'	ruagi 'mosquito'
	12	13	8
Totals for Paradigm 3:	35 (27%)	66 (50%)	30 (23%)

* The three figures for each triad indicate the number of respondents who selected each word as most different.

** Selection of a word in this column as most different is consistent with classification on the basis of noun class.

4. Summary

This study has addressed itself to a controversy over the semantic status of the noun class, a syntactic category in Bantu languages. Previous investigators have failed to demonstrate whether in fact noun classes have a semantic reality to the speakers of Bantu languages. This problem has heretofore been addressed by examination of the distribution of denotata across syntactic categories; in these studies it has been the foreign researcher who has painted the semantic patterns. In the present study we attend, rather, to the classificatory behavior of Kikuyu, allowing Kikuyu respondents themselves to do the patterning through their responses to a test of triadic comparisons among a set of interrelated concepts.

From informants' responses to the triads test, we assess the effect of noun class membership on Kikuyu judgments of similarity of meaning. Using a hierarchical clustering procedure, we find that the primary distinctions to which people attend (size and phylogeny) are independent of noun class. By doing an additional evaluation, however, involving examination of minimal contrast sets, we demonstrate that noun class has a statistically significant effect on triads choices when other contrasts are controlled. We conclude that Kikuyu respondents treat noun class as a tertiary feature when doing semantic classification.

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