Cognitive Aspects of English Kin Terms

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THE study of kinship terminology has long been of central interest in anthropology. Formal methods of description developed by linguists, such as componential analysis, have been applied with success to kinship terminologies. It has been claimed that such descriptions, in addition to representing the data in an abstract, structural, and elegant manner, uncover and represent psychological reality for the native users of these systems. For example,

> Goodenough repeatedly states in his paper on Trukese terminology that the purpose of the componential analysis of kinship terms is to provide psychologically real definitions. . . . Now this is a major theoretical commitment. It happens to be one we share: a part of anthropology's mission which is of particular concern to us is the development of formal theories and methods which will describe the relationship between cultural forms and processes, and their social-structure correlates, whose locus is a society, and psychological (cognitive) forms and processes, whose locus is the individual (Wallace and Atkins 1960:75).

This claim is, we believe, an important hypothesis: This paper reports the results of an attempt to test this hypothesis with American-English kinship terminology. However, we are equally interested in the other side of the coin, that is, in those aspects of the individual's psychological or cognitive structure which are not represented in formal analyses.

We begin with the presentation of two alternative componential analyses of American-English kin terms. Then the results of a series of psychological tests, designed to measure different aspects of the individual's cognitive structure concerning kin terms, are related to these componential models. An attempt is made to assess the validity of each of these models and the psychological implications of componential analyses in general.

COMPONENTIAL ANALYSES OF AMERICAN-ENGLISH KINSHIP TERMINOLOGY

Wallace and Atkins in a review of the methods of componential analysis, present a componential paradigm for American-English kin terms. The steps involved in this analysis are given as:

> The componential analysis of a kinship lexicon commonly consists of five steps: (1) the recording of a complete set (or a defined sub-set) of the terms of reference or address, using various boundary-setting criteria, such as a constant syntactic context, a type of pragmatic situation, or common inclusion within the extension of a cover term for "kinsmen"; (2) the definition of these terms in the traditional kin-type notation (i.e., as Fa, FaBr, DaHuBr); (3) the identification, in the principles of grouping of kin-types, of two or more conceptual dimensions each of whose values ("components") is signified (not connoted) by one or more of the terms; (4) the definition of each term, by means of a symbolic notation, as a specific combination, or set of combinations, of the components; (5) a statement of the semantic relationship among the terms and of the structural principles of this terminological system (Wallace and Atkins 1960:60).

The recorded subset which Wallace and Atkins select is made up of consanguineal kin terms whose denotata in kin types are given as—

Grandfather: FaFa, MoFa
Grandmother: FaMo, MoMo
Father: Fa
Mother: Mo
Brother: Br
Sister: Si
Son: So
Daughter: Da
Grandson: SoSo, DaSo
Granddaughter: SoDa, DaDa
Uncle: FaBr, MoBr, FaFaBr, MoFaBr, etc.
Aunt: FaSi, MoSi, FaFaSi, MoFaSi, etc.
Cousin: FaBrSo, FaBrDa, MoBrSo, MoBrDa, FaSiSo, FaSiDa, MoSiSo, MoSiDa, FaFaBrSo, FaMoBrSo, MoFaSiDa, etc.
Nephew: BrSo, SiSo, BrSoSo, SiSoSo, etc.
Niece: BrDa, SiDa, BrDaDa, SiDaDa, etc.

Wallace and Atkins point out that the range of kin types is bound (for the sake of simplicity) at two generations above and below ego and that the last five terms have been used in their "extended sense," thus including cousin in the sense of second cousin once removed, aunt in the sense of great aunt, and nephew in the sense of grand nephew, and so on. Stages 3, 4, and 5 are presented by them as follows:

> Stage 3: we observe that all but one of these terms (cousin) specifies sex of relative; some specify generation; all specify whether the relative is lineally or nonlineally related to ego; and nonlineal terms specify whether or not all the ancestors of the relative are ancestors of ego, or all the ancestors of ego are ancestors of the relative, or neither. From these observations we hypothesize that three dimensions will be sufficient to define all the terms: sex of relative (A): male (a_1), female (a_2); generation (B): two generations above ego (b_1), one generation above ego (b_2), ego's own generation (b_3), one generation below ego (b_4), two generations below ego (b_5); lineality (C): lineal (c_1), co-lineal (c_2), ablineal (c_3). We use Goodenough's definition of the values on this dimension of lineality; lineals are persons who are ancestors or descendants of ego; co-lineals are non-lineals all of whose ancestors include, or are included in, all the ancestors of ego: ablineals are consanguineal relatives who are neither lineals nor co-lineals (Goodenough, private communication). Stage 4: we define the terms now by components, adopting the convention that where a term does not discriminate on a dimension, the letter for that dimension is given without subscript. The definitions are represented paradigmatically [below]:

<table>
<tr><th></th><th colspan="2">c_1</th><th colspan="2">c_2</th><th colspan="2">c_3</th></tr>
<tr><th></th><th>a_1</th><th>a_2</th><th>a_1</th><th>a_2</th><th>a_1</th><th>a_2</th></tr>
<tr><td>b_1</td><td>grandfather</td><td>grandmother</td><td rowspan="2">uncle</td><td rowspan="2">aunt</td><td colspan="2" rowspan="5">cousin</td></tr>
<tr><td>b_2</td><td>father</td><td>mother</td></tr>
<tr><td>b_3</td><td colspan="2">[ego]</td><td>brother</td><td>sister</td></tr>
<tr><td>b_4</td><td>son</td><td>daughter</td><td rowspan="2">nephew</td><td rowspan="2">niece</td></tr>
<tr><td>b_5</td><td>grandson</td><td>granddaughter</td></tr>
</table>

A componential paradigm of American English consanguineal core terms.

> Evidently each term has been so defined, with respect to the components selected, that no term overlaps or includes another; every component is discriminated by at least one term; and all terms can be displayed on the same paradigm. We do not wish to argue that this is the best representation; only that it is adequate to define the set of terms chosen (Wallace and Atkins 1960:61–62).

A second method developed by Romney uses a different set of operations and yields slightly different results. This method begins with a basic set of symbols as follows:

m represents male
f represents female
a represents person of either sex
= represents marriage bond
0 represents sibling link (used only where individuals share both parents, i.e., "full" siblings)
\+ represents parent link
− represents child link
( ) represents an expansion
superscripts represent number of expansions
subscripts represent sex correspondences

These basic symbols are combined to represent kin types in the same way as standard abbreviations except that ego or sex of speaker is always explicitly indicated.

The notation and a subsequent analysis will be applied to the hypothetical English system reported by Wallace and Atkins (1960:61). The terms defined by kin types written in the present notation are:

Grandfather:	a+m+m a+f+m
Grandmother:	a+m+f a+f+f
Father:	a+m
Mother:	a+f
Brother:	a 0 m
Sister:	a 0 f
Son:	a−m
Daughter:	a−f
Grandson:	a−m−m a−f−m
Granddaughter:	a−m−f a−f−f
Uncle:	a+m 0 m a+f 0 m a+m+m 0 m a+f+m 0 m etc., (also the following not included by Wallace) a+m 0 f=m a+f 0 f=m etc.
Aunt:	a+m 0 f a+f 0 f a+m+m 0 f a+f+m 0 f etc., (also the following not included by Wallace) a+m 0 m=f a+f 0 m=f etc.
Nephew:	a 0 m−m a 0 f−m a 0 m−m−m a 0 f−m−m etc., (also the following not included by Wallace) f=m 0 m−m m=f 0 m−m etc.
Niece:	a 0 m−f a 0 f−f a 0 m−m−f a 0 f−m−f etc., (also the following not included by Wallace) f=m 0 m−m m=f 0 m−m etc.

Cousin:	a+m 0 m−m	a+f 0 f−m
	a+m 0 m−f	a+f 0 f−f
	a+f 0 m−m	a+m+m 0 m−m
	a+f 0 m−f	a+m+f 0 m−m
	a+m 0 f−m	a+f+m 0 f−f
	a+m 0 f−f	etc.

The list of kin types following each kin term will be called the *range* of that term. An analysis of the terminological system begins with a listing of the *range* of each term as above. The next step is to reduce the *range* of each term to a single notational expression. (In the above example, Father, Mother, Brother, Sister, Son, and Daughter are already single expressions.)

The rules of the reduction of *ranges* to single expressions are outlined below.

Rule 1. *Rule of Minimum Difference Within Range.* Where two kin types within a range are identical except for a difference in sex markers in the same position, the two kin types may be written as one with an a in the contrasting position. Apply Rule 1 before all others.

The rule may be exemplified by the range of Grandfather where the range is indicated as:

a+m+m and
a+f+m

The two kin types differ only in the sex markers of the medial position. Thus, the two kin types may be rewritten as: a+a+m. The rule of minimum difference will reduce all ranges in the above system to a single expression except for Uncle, Aunt, Nephew, Niece, and Cousin. For these, another rule is necessary.

Rule 2. *Rule of Sequence Difference Within Range.* Where two expressions are identical except for one additional "link" (i.e., a pair consisting of one sex and one relation marker), the "link" may be written in parentheses. The parentheses will indicate an optional expansion. This rule may be applied in sequence but must be labeled with a superscript indicating number of reductions made.

For example, assume the following range:

m+f 0 m
m+f 0 m−m
m+f 0 m−m−m

where it is desired to reduce these kin types to a single expression. Rule 2 provides the following convention:

$$\mathrm{m+f\ 0\ (m-\ )^{0,1,2}m}$$

where the parentheses indicate optional inclusion of the enclosed link, and the superscripts indicate number of applications of option.

The same rule holds for "affinal" links. Thus:

a+m 0 m
a+m 0 f=m
a+f 0 m
a+f 0 f=m

reduce to a+a 0 (f=)m

The application of these two rules completely reduces the ranges of the English system to single expressions as follows:

Grandfather	a+a+m
Grandmother	a+a+f
Father	a+m
Mother	a+f
Brother	a 0 m
Sister	a 0 f
Son	a−m
Daughter	a−f
Grandson	a−a−m
Granddaughter	a−a−f
Uncle	$a+a(+a)^{0,1}\ 0\ (f=)m$
Aunt	$a+a(+a)^{0,1}\ 0\ (m=)f$
Nephew	$a(=a)\ 0\ (a-)^{0,1}a-m$
Niece	$a(=a)\ 0\ (a-)^{0,1}a-f$
Cousin	$a+a(+a)^{0,1,2}\ 0\ (a-)^{0,1,2}a-a$

Before proceeding to the analysis of the structure of the above terms and expressions, two additional rules for the reduction of kin types within ranges to a single expression will be mentioned. These rules, though not necessary for the analysis of the English system, are useful for other systems.

Rule 3. *The Rule of Paired Sequence Difference Within Ranges.* This rule is used widely for the analysis of systems recognizing the parallel vs. cross distinction. It may be thought of as an extension of Rule 2. Where two expressions are identical except for "paired links," the "paired links" may be written in parentheses. The parentheses will indicate an expansion, and superscripts will indicate number of expansions. In addition, the subscripts i and j will be used on the sex markers to indicate appropriate handling of sex when the expression is expanded.

Take for example the following hypothetical range:

a+m 0 m−a
a+f 0 f−a
a 0 a

Rule 3 provides the following single expression:

$$a(+a_i)^x\ 0\ (a_j-)^y a$$
where $x=y=0, 1$
and $i=j$

The subscripts i and j may also be used for relative sex of speaker.

Rule 4. *The Rule of Reciprocals Within Ranges.* Where two expressions differ only by the fact that they are complete reciprocals of one another, either expression may be written between slashes and be taken to represent both. In the present notation, a reciprocal of any kin type is found by writing the expression in reverse order and changing all +'s to −'s and *vice versa,* without changing 0 and = links.

For example, if a range included the kin types m+f 0 m and m 0 f−m, they could be reduced to the single expression, /m+f 0 m/. In practice, we have found it most convenient to put the ascending generations between slashes.

Perhaps at this point the rationale behind the development of this new notational system can be stated clearly. This notational system contains exactly the same information as the traditional systems. The difference is that in this notation, all information is represented explicitly. For example, if one wished to program a computer with the traditional notation to identify those kin terms which refer solely to male kin types, it would be necessary to give the machine special instructions that the symbols "Fa," "Br," "So," and "Hu" stand for males (as well as other things). Such additional instructions are not necessary for the notation given here.

Structural Analysis of Terms. We return to the task of completing a structural analysis of the expressions given above. A structural analysis may proceed on the basis of a set of rules in much the same way that within-range reductions were made. The essential difference is that the operations at this stage of analysis reveal structural principles rather than produce reduced expressions of ranges. The following rules are to be applied in ordered sequence as listed. They apply to the reduced expressions produced by procedures outlined above.

Sex of Relative. If two expressions are identical except for the final sex marker, then *sex of relative* is a distinctive variable. Whenever a distinctive variable is discovered by any of the procedures in this section, it is noted for the appropriate terms. Then the expressions involved are combined and carried along in the analysis.

For example, the expressions for Grandfather and Grandmother above are a+a+m and a+a+f, and they differ only by the final sex marker. Hence, *sex of relative* is a distinctive variable. It may be marked as R and takes the values R_1 male and R_2 female. We then mark Grandfather as R_1 and Grandmother as R_2. We now combine the expressions into a+a+a (or more simply, ++), which is carried along for further analysis.

Sex of Speaker. If two expressions are identical except for the initial sex marker, then *sex of speaker* is a distinctive variable. It may be marked as S and takes the values S_1, male speaking, and S_2, female speaking. Where a variable is nowhere recognized in a system, it would not be marked anywhere. Thus S does not appear in the description of English.

Relative Sex. If two expressions are identical except for the fact that in one, sex of speaker is the same as the relative and in the other, it is different, then *relative sex of speaker* is the distinctive variable. It may be marked as D and takes the values D_1, different, and D_2, the same.

Relative Age. If two expressions are identical except for relative age, then *relative age* is a distinctive variable. It may be marked as A and takes the values A_1, relative older than ego, and A_2, relative younger than ego. (Sometimes relative age of intervening relatives is criterial.)

Reciprocity. If two expressions are identical except for being reciprocals, then *polarity* is a distinctive variable. It may be marked by P and takes the values P_1, senior or ascending generation, and P_2, junior or descending generation.

Sex of Intervening Relative. Where two expressions are identical except for intervening relative, then *cross vs. parallel* is a distinctive variable. It may be marked by C and takes the value C_1, cross, and C_2, parallel.

Further Differences in Expressions. Let us summarize the appearance of the analysis of English to this point. The application of the procedures in this section produce the following:

Term	Extracted Components	Remaining Expression
Grandfather	R_1P_1	
Grandmother	R_2P_1	/++/
Grandson	R_1P_2	
Granddaughter	R_2P_2	
Father	R_1P_1	
Mother	R_2P_1	/+/
Son	R_1P_2	
Daughter	R_2P_2	
Uncle	R_1P_1	
Aunt	R_2P_1	/+(+) 0 /
Nephew	R_1P_2	
Niece	R_2P_2	
Cousin	R P	+(+) 0 (−)−
Brother	R_1P	0
Sister	R_2P	

In order to complete the analysis, it is necessary to have a small list of common distinctive variables that characterize systems. Examples of such variables include direct vs. collateral, generation, etc. Up to this point the steps in the analysis are explicit. The procedures have reduced 15 kin terms to five range-sets. We know of no way to specify a single best solution for the classification or arrangement of these five range-sets. Taste, previous knowledge of the system, emphasis on core kin types, and other factors affect the outcome. Three possible solutions are shown in Fig. 1:

Primary	Secondary	Tertiary
/+/	/++/	+(+) 0 (−)−
0	/+(+) 0 /	

FIG. 1. First analysis of American kinship system.

This solution stresses the distinction between relatives in the nuclear family and those outside the nuclear family. This is a simplification of Parson's picture of the American kinship system where "primary" relatives correspond to his "inner" circle (Parsons 1943:179).

The second solution (Fig. 2) corresponds to the distinction referred to by Wallace and Atkins above (1960:62).

	Lineal	Co-lineal	Ablineal
±2	/++/	/+(+) 0 /	+(+) 0 (−)−
±1	/+/		
0	ego	0	

FIG. 2. Second analysis of American kinship system.

The third solution (Fig. 3) is the one we prefer and the one that will be used in the remainder of the paper. It emphasizes the core or kernel kin type and hence treats "cousin" as a zero generation relative.

	Direct		Collateral		
	male	female	male	female	
+2	GrFa	GrMo	Un	Au	+
-2	GrSo	GrDa			
+1	Fa	Mo	Ne	Ni	-
-1	So	Da			
0	Br	Si	Co		0

FIG. 3. Third analysis of American kinship system.

Note that the dotted lines in Fig. 3 represent the relations between terms obtained with simple operations on the notation scheme. Since the notation scheme represents the genealogical elements, it may be assumed that terms joined by dotted lines are somehow "closer" than terms separated by solid lines. (Although Wallace and Atkins use dotted lines between sex pairs, e.g., mother and father, they are not derived from steps in the analysis.) The dotted lines arise from the analytic procedures. Terms within solid lines (separated only by dotted lines) are defined as constituting a *range-set.*

COGNITIVE IMPLICATIONS AND INDIVIDUAL BEHAVIORAL MEASURES

There appear to be two separate issues with respect to the cognitive implications of the analyses presented above. The first issue deals with the problem of alternative componential structures, while the second issue involves the selection of behavioral measures that would be affected if a componential analysis were isomorphic with cognitive structure.

There are two possible solutions to the first issue; that is, either one analysis is more efficient than the other in providing a cognitively accurate representation, or individuals have more than one cognitive structure with which they may operate. If the individuals in a culture have alternative cognitive structures, it is possible that either different individuals have arrived at different cognitive structures or that the same individual operates with alternative structures.

It is our feeling that there will usually be several alternative analyses possible for any set of kin terms. If we are to talk about psychological or cognitive implications of an analysis, we must specify what these implications might be. Probably some analyses will be more useful for some purposes and less useful for others. Thus there may be no single best solution for a given system.

It should be pointed out that differences in Romney's and Wallace and Atkins', analyses are due to more than one factor. One difference is due to the definition of components, especially in the definition of collaterality. Another source of difference is that Romney uses an entirely different component (reciprocity) as a basic means of aligning range sets. These alternative results highlight the fact that componential analysis is not an automatic method of uncovering individual cognitive structures. Slight differences in the operations or the definition and number of components imply different pictures of psychological reality. We feel that the solution to this problem lies in further behavioral measures of individual cognitive operations.

As Wallace and Atkins (1960:78) say,

> But the only way of achieving definite knowledge of psychological reality will be to study the semantics of individuals both before and after a formal, abstract, cultural-semantic analysis of the terms has been performed. Simple demands for verbal definition, the use of Rivers' genealogical method, and analysis of the system of kinship behaviors may not be sufficient here: additional procedures, by individual representative informants, of matching and sorting, answering hypothetical questions, and description of relationships in order to reveal methods of reckoning will probably all be required.

Following this suggestion, we have collected a variety of data on English kinship from large samples of high school students, utilizing a number of different techniques. The techniques that we have used include the following:

1. A listing of kin terms in free recall.
2. The semantic differential.
3. Direct judgments of similarity and difference with the triad method.

The general prediction we have made from componential analyses to cognitive measures is that the more components any two terms have in common, the greater will be the similarity of response to these terms. This prediction is derived from the assumption that the components of a term constitute the meaning of that term for an individual; hence, the more components which are shared, the more similar the meaning. We use component at two levels of contrast: first, as a dimension, e.g., generation or sex; second, as a value on a dimension, e.g., zero generation or male sex. Context should make clear which level is being referred to.

At this point we have not differentiated between denotative or referential meaning and affective or connotative meaning (although we believe componential analysis would correspond most closely to denotative meaning). Nor have we attempted to prejudge which measures of similarity actually measure similarity in meaning. These issues will be discussed later in the paper as data are presented.

TABLE I. LIST OF BASIC RELATIVES IN ORDER OF MEAN POSITION IN THE LISTS WITH PERCENTAGE OF SUBJECTS LISTING TERM (n = 105)

Term	%
1. Mother	93
2. Father	93
3. Aunt	92
4. Brother	90
5. Sister	87
6. Uncle	98
7. Grandmother	97
8. Grandfather	94
9. Cousin	98
10. Niece	61
11. Daughter	31
12. Nephew	65
13. Son	29
14. Granddaughter	17
15. Grandson	17

Listing Task. One task we set for a group of 105 high school students was to "list all the names for kinds of relatives and family members you can think of in English." We were interested in the types of inferences we could draw concerning the cognitive structure of the kin terms from the order, frequency of recall, and productiveness of modifiers (such as "step-," "-in-law," etc.).

The "saliency" of kin terms is not considered explicitly in most formal analyses but is of interest from a psychological point of view. There are two indices of saliency available in the listing data. The first is the position of a term in the list. We assume that the nearer the beginning of a list that a kin term occurs, the more salient it is. The second index of saliency is the per cent of subjects who remember the term. We assume that the more salient terms will be recalled more frequently. Table I lists the basic kin terms in the rank order of their mean position in the freely recalled list. ("Mother," for example, occurs nearest the beginning of the list, on the average.) In addition, the per cent of subjects listing the term at all is indicated.

It can be seen that there is fair correspondence between the two measures of saliency. The main discrepancies center upon the terms uncle, grandmother, grandfather, and cousin, all of which are remembered by more subjects than would be expected from their position in the list. It is of interest to note that *son* and *daughter* are low in saliency for high school students and that less than a third of them remember to include these terms.

One overwhelming regularity in the order of items in the individual lists was the adjacent occurrence of pairs of relatives differing only in the component of sex, e.g., pairs like father-mother, son-daughter, uncle-aunt, etc. These pairs occurred 98 per cent of the time on individual lists containing both

TABLE II. PERCENTAGE OF SUBJECTS MODIFYING KIN TERMS WITH COMMON MODIFIERS (frequencies below 10 excluded)

	step	in-law	great	half	second
Father	55	54	—	—	—
Mother	55	57	—	—	—
Son	20	28	—	—	—
Daughter	20	30	—	—	—
Brother	55	73	—	28	—
Sister	50	63	—	25	—
Grandfather	—	—	78	—	—
Grandmother	—	—	77	—	—
Grandson	—	—	33	—	—
Granddaughter	—	—	33	—	—
Uncle	—	—	63	—	—
Aunt	—	—	52	—	—
Nephew	—	—	10	—	—
Niece	—	—	10	—	—
Cousin	—	—	—	—	60

terms. This suggests that an immediate constituent analysis is appropriate to list data and that these pairs may be taken as an immediate constituent vis-a-vis other terms in the list.

The listing task also allowed inferences about the cognitive structure of the terms from an analysis of the modifiers occurring with the various kin terms Modifiers that occurred with a frequency of as much as 25 per cent with any term are given in Table II with percentage of occurrence of each term (frequencies below 10 per cent are excluded as being idiosyncratic or a variant usage)

Note that kin terms within the same range-set (terms bounded by the solid line in Romney's analysis) always occur with identical modifiers. Also note that every range-set takes different combinations of modifiers except for most distant generation sets separated by direct-collateral distinction (i.e. *Grandfather*, etc., set not distinguished from *Uncle*, etc., set by modifiers).

The number of modifiers is maximum for "close" sets and minimum fo "distant" sets. *Brother* and *sister*, for example, take three modifiers while the more distant *cousin* takes only one. This conforms to the anthropological assumption that maximum terminological differentiation will occur with "close" relatives and progressively less differentiation with "remoter" relatives (or, more generally, that greater lexical differentiation will occur in areas of most interest and importance).

The classification of kin terms produced by partitioning of terms on the basis of sharing identical sets of modifiers is shown in Fig. 4.

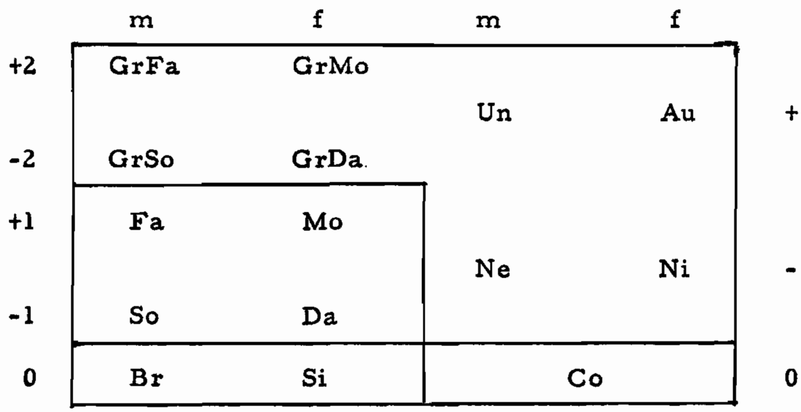


FIG. 4

One of the implications of these data is that all kin terms occurring with the same modifier may be thought of as occurring in a similar response environment. Thus, for example, the fact that "half-brother" and "half-sister" occur (while no other kin term occurs with "half") may be seen as a kind of "response similarity" between "brother" and "sister." The fact that no range-sets are partitioned by any modifying word together with the fact that sets of terms occurring with the same modifier are bounded by components (or combinations of components) may be interpreted as supporting the idea that terms are classified by components.

Semantic differential. Next, Osgood's semantic differential procedure (Osgood, Suci, and Tannenbaum, 1957) was used to investigate the effect the componential composition of a term has on other verbal responses made to that term. The issue here deals with the nature of the verbal stimulus to which a subject responds when he makes a rating on the semantic differential. That is, do subjects make a semantic differential rating for the term *father* on the basis of the components which constitute the referential meaning of the term, or do they respond uniquely to *father* as an indivisible lexical item?

In order to put this issue to test, the following methods were used. First, bipolar adjective ratings for *good-bad*, *nice-awful*, *kind-mean*, *heavy-light*, *hard-soft*, and *fast-slow* were obtained for the concepts *father*, *mother*, *brother*, *sister*, *man*, *woman*, *boy*, *girl*, and *myself*. The sample consists of 86 six to thirteen-year-old children. The ratings were obtained in an interview in which each child was asked, "Is a *father* (*mother*, etc.) *good* or *bad* (*hard* or *soft*, etc.)?" If the child answered, "*Bad*," he was then asked, "Is a *father* very *bad* or just a little bit *bad?*" From these responses, a five-point-scale rating was constructed with the mid-point consisting of instances in which the child rejected the first question or said "both" or "neither."

An intercorrelation matrix and factor analysis was computed on the Fortran Bi Med Program for adjective scales and was rotated to simple structure using the Verimax program. Two clear factors were found, each composed of three sets of adjectives, which correspond to the evaluation and potency dimensions (see Table III).

For the second step of the analysis, factor scores were computed for each individual for each concept. Scores were computed by adding the raw scores for the three bipolar adjective scales for each factor.

TABLE III. ROTATED FACTOR ANALYSIS FOR SEMANTIC DIFFERENTIAL BIPOLAR ADJECTIVES

	Factor Loading		
	I	II	III
Good-bad	.64	.00	−.04
nice-awful	.61	.01	−.01
kind-mean	.65	.00	.02
hard-soft	−.20	.56	.19
heavy-light	.00	.58	−.25
fast-slow	.10	.64	−.04

Fig. 5 presents the mean Evaluation and Potency scores for each concept plotted on a two dimensional space. The scores for *myself* were found to be significantly different for boys and girls and so were plotted separately.

From the spatial arrangement of the concepts on the two factor dimensions, it can be seen that there is a tendency for sets of concepts to cluster gether. However, such clustering offers little evidence that these children were responding to the components of the terms.

However, if subjects were responding uniquely to each item, then it would be impossible to predict the factor score for one item from the factor score of any other. To the extent that subjects are responding to the components, then, a factor score for an item which represents the response to a particular component will predict the factor score for another item which shares the same component. For example, if subjects are responding to the female component in the terms *woman* and *sister* on the potency dimension, the potency score for *woman* should be correlated strongly with the potency score for *sister*. (The potency scores need not be identical for *woman* and *sister*, they should merely covary.)

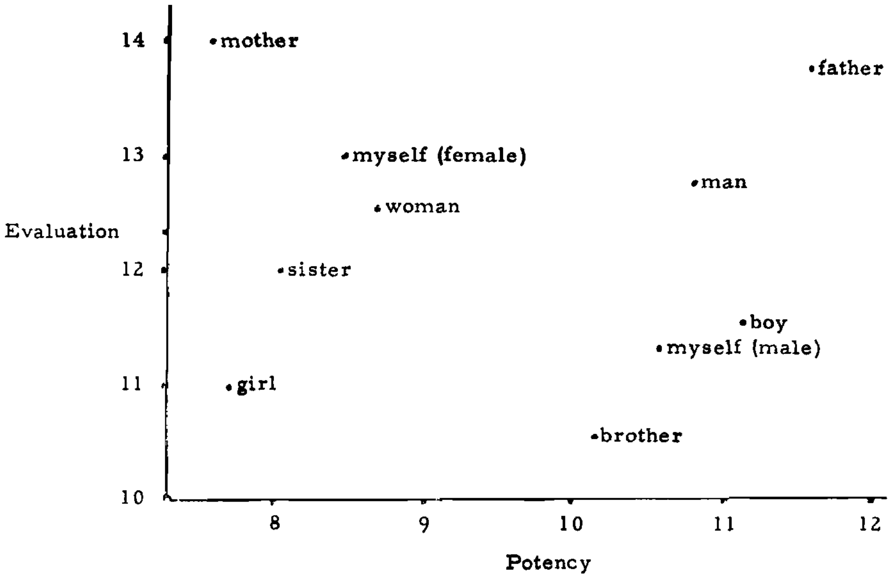


FIG. 5. Mean semantic differential factor scores.

To test the hypothesis that the componential structure of this set of terms would be reflected in the correlations between factor scores for different items, a correlation matrix and a factor analysis of this matrix was computed. (While a factor analysis of a set of factor scores may seem overly complex, the purposes of the two analyses are simple and different. The first factor analysis was computed to find out which sets of adjectives go together. The second factor analysis was performed to find which kin and person term scores go together.)

The results are presented in Table IV. Again, the Fortran Bi Med and Verimax programs were used.

In Table IV, beneath each set of factor loadings, the component which the majority of items have in common is presented. Only two terms are inconsistent with the majority of factor items; the potency score for *self* (for girls) which appears with a low factor loading in a set of terms which are otherwise all males, and the evaluation score for *sister*, which occurs with a low factor loading in a set of terms which are otherwise all young males.

While the consistent groupings of scores by components indicate that to some degree subjects rate terms as if they were rating the components of these terms, still the data contain some anomalies. The set of "young" terms (brother, sister, boy, girl, self, for boys and girls) does not emerge as a factor, but is split by sex into two factors, as if the components of youngness and sex interacted to form a unique connotative meaning. A second unpredicted result of the factor analysis is that kinship terms did not separate from personal status terms, although semantically these are separate domains. However, perhaps the technique of the semantic differential makes the separation of domains unlikely, since adjectives are selected for their applicability across a wide range of domains.

Triads test. In order to investigate further the internal cognitive structuring of American-English kin terms, a sorting test was devised, adapted from procedures used in psychophysical measurement (Torgerson 1958) and in clinical psychology (Kelley 1955). This test is called the triads test and consists of presenting sets of three terms to the subject who is instructed to designate which of the three terms is the most different in meaning. For example, a subject would be presented with the triad, *father*, *son*, *nephew*, and asked to pick out the term which is most different in meaning. (In our sample, 67 per cent of the subjects selected *nephew* as most different, 22 per cent selected *father* and 2 per cent selected *son*.)

TABLE IV. FACTOR LOADING FOR SEMANTIC DIFFERENTIAL CONCEPT SCORES ON EVALUATION AND POTENCY (all loadings above ∓.30 reported)

Factor 1.	.80	Evaluation score for *man*
	.78	Evaluation score for *mother*
	.77	Evaluation score for *woman*
	.60	Evaluation score for *father*
		("adult" component)
Factor 2.	.81	Potency score for *man*
	.80	Potency score for *self* (for boys)
	.71	Potency score for *father*
	.70	Potency score for *brother*
	.54	Potency score for *boy*
	.43	Potency score for *self* (for girls)
		("male" component)
Factor 3.	.84	Potency score for *sister*
	.75	Potency score for *girl*
	.66	Potency score for *woman*
	.42	Potency score for *self* (for girls)
	.30	Potency score for *mother*
		("female" component)
Factor 4.	.97	Evaluation score for *self* (for boys)
	.73	Evaluation score for *boy*
	.55	Evaluation score for *brother*
	.35	Evaluation score for *father*
	.35	Evaluation score for *sister*
		("young and male" components)
Factor 5.	.84	Evaluation score for *self* (for girls)
	.82	Evaluation score for *girl*
	.45	Evaluation score for *sister*
	.30	Evaluation score for *woman*
		("young and female" components)

This task of choosing the most different of three items is a slightly more complex variety of the frequently used procedure of asking persons to state whether two items are the *same* or *different*. Here, the person is asked which two of three objects are *more* similar, or which one is *more* different. The ambiguity in this type of task concerns the question of "same or different with reference to what?" The instructions requested the subject to pick out the term which is most different *in meaning*. We wished to have the subject sort terms on the basis of similarity in referential meaning. In this respect, this procedure differs from the listing task which is thought to measure the strength of association. Similarity in referential meaning may, of course, affect the strength of association, but other conditions such as frequent contiguity in normal speech are also likely to increase association frequencies.

It is not possible to prove that all our subjects always sorted on the basis of referential meaning. However, we have interviewed a handful of subjects about their reasons for their classifications, and the subjects' verbalizations seem consistently referential. For example, one subject (untouched by anthropological knowledge) gives the following criteria for her sorting:

father-uncle-cousin: "a father is the most different; uncles and cousins are both offshoots"
father-son-brother: "a brother is most different because a father has a son and a son has a father, but a brother has a brother or sister"
brother-son-grandson: "a grandson is most different, because he is more remote"
grandson-brother-father: "a grandson is most different because he is moved down further"
newphew-son-grandson: "a nephew is most different because he is offside. (I: What is offside?) Not in the same line."

Given that subjects do sort predominantly on the basis of referential meaning, what predictions can be made from a componential analysis about the triads test? First, let us restate our assumptions, as follows:

(1) The referential meaning of a term for an individual consists of the components of that term.
(2) The more components held in common by any two terms, the more similar the terms in referential meaning.

Given these assumptions, what predictions can be made from a componential analysis? Consider the simple subset of kin terms presented in Fig. 6.

Only two components are involved, sex and generation. *Father* and *mother* share an identical component for generation, but differ on sex. *Father* and *son* share the identical component of sex but differ on generation. However, *father* and *daughter* do not share either component. (Although they do, of

	Male	Female
Ascending Generation	Father	Mother
Descending Generation	Son	Daughter

FIG. 6. Subset of American kin terms.

course, share other components not in contrast for this subset of terms, such as reciprocity, direct lineality, etc.) Therefore, the prediction is that the term *father* will be classed as more similar to *mother* than to *daughter* and classed as more similar to *son* than to *daughter*. This will hold true no matter what strength is given to the component of sex compared to the component of generation. That is, even if a person regards sex differences as trivial and generation differences as extreme, so long as some strength is given to sex differences, *father* will be classed as more similar to *son* than to *daughter*.

If we then present all possible triads for this set of four terms and ask subjects to select the most different in meaning in each triad, we should find fewer cases in which *mother* and *son* or *father* and *daughter* were classed together than the other possible pairs. The empirical results, for a sample of 10 high school students, is presented in Table V.

TABLE V. ALL POSSIBLE TRIADS FOR THE SET FATHER, MOTHER, SON, DAUGHTER

1.	father	(0)*	mother	(4)	son	(6)
2.	father	(3)	mother	(0)	daughter	(7)
3.	father	(5)	son	(0)	daughter	(5)
4.	mother	(3)	son	(7)	daughter	(0)

* Figures in parentheses indicate the number of times a term was selected as most different in meaning from the other two terms in the triad by 10 subjects.

From this table we can compute an average (mean) for the number of times each pair of kin terms are classed together by summing the number of times any two terms are classed together (i.e., are *not* circled) and dividing by the number of subjects. For example, in the table above, *father* and *mother* are classed together six times in the first triad and seven times in the second triad for a total of 13 pairings for 10 subjects, or a mean of 1.3 pairings. Fig. 7 presents these mean figures. The empirical data conforms well to the predicted results. In no case did any subject cross two components. (The same results were found for the subset of terms *uncle, aunt, niece,* and *nephew*.)

Since the componential analyses by Romney and by Wallace and Atkins differ slightly, they imply slightly different predictions. In order to test these predictions, it would have been most effective to use all the kin terms contained in

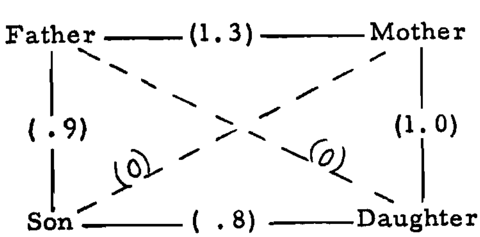


FIG. 7. Pairing of selected kin terms. Frequencies in parentheses represent mean number of times a pair of terms were classed together

the analyses. However, the major drawback of the triads method is that the number of triads increases drastically with the number of items. The formula for computing the number of triads in n items is

$$\frac{n!}{3!\ (n-3)!}$$

Thus, while there are only 56 possible triads for eight kin terms, there are 455 possible triads for 15 kin terms. Therefore, two questionnaire forms were used, each containing eight kin terms. Part of the data for the first questionnaire, which contained the terms *father*, *mother*, *son*, *daughter*, *uncle*, *aunt*, *niece*, and *nephew*, has already been presented. The main purpose for using this set of terms was to ascertain that pairs of relatives, such as *father-mother* or *niece-nephew*, which have identical components except for sex, would be classed together with high frequency. The results indicated clearly that these sex pairs are classed together with very high frequency. This finding makes it possible to reduce the subset of kin terms to only one sex since the addition of the opposite sex kin terms into the sorting task is not likely to change the results.

The second questionnaire contained the eight male terms, including *cousin*, used in Romney's and in Wallace and Atkins' componential analyses (*grandfather*, *father*, *brother*, *son*, *grandson*, *uncle*, *cousin*, *nephew*). The triads test was given in questionnaire form to 150 public high school students. 116 forms were accepted for analysis. Forms which were incomplete or which showed clear position preference or which were from students whose cultural backgrounds might have unusual designations for English kin terms were rejected. The results are summarized in Table VI for total number of times each pair of terms was classed together across all triads.

The distribution of mean responses for this table has a possible range from zero to 6.0, with 2.0 responses expected in each cell by chance. The observed table has a skewed (or almost bimodal) distribution of responses, with only eight pairs occurring with a frequency above expectancy, and nineteen pairs

TABLE VI. MEAN NUMBER OF TIMES EACH PAIR OF KIN TERMS WERE CLASSED TOGETHER

	Father	Brother	Son	Grandson	Uncle	Cousin	Nephew
grandfather	3.9	1.0	1.4	4.3	1.5	.6	.9
father		2.4	3.9	1.6	2.0	.6	.6
brother			3.8	1.6	1.6	1.7	1.5
son				3.1	.6	1.4	1.2
grandson					.7	1.1	1.7
uncle						3.5	3.7
cousin							4.2

Chance expectancy = 2.0
N = 116

occurring below expectancy. A schematic representation of which pairs are classed together more frequently than expected by chance is presented in Fig. 8.

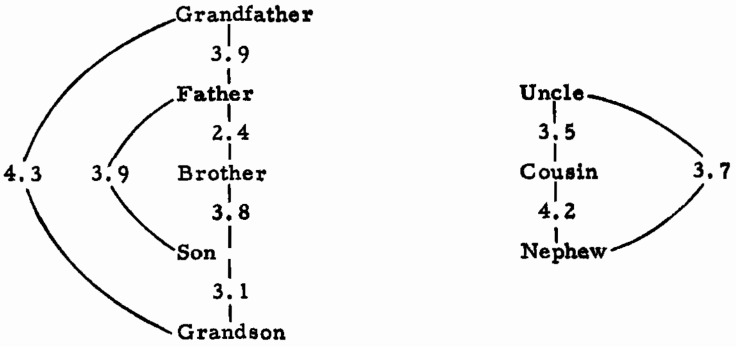


FIG. 8. Schematic representation of high frequency pairings of kin terms.

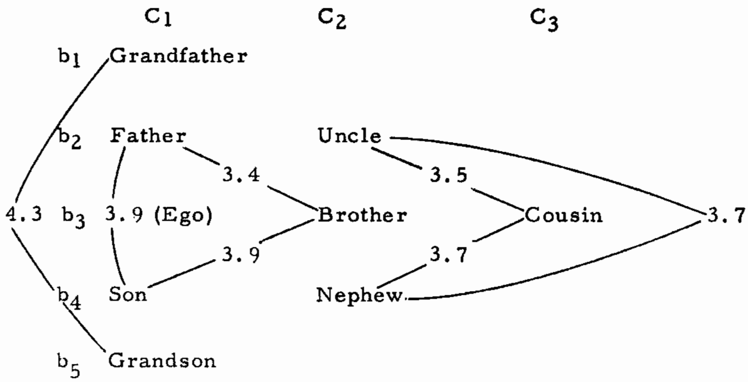
The schematic diagram presented in Fig. 8 is not the best spatial representation possible for picturing degree of similarity, since an effective representation would have all high-frequency pairings occurring in adjacent spaces. When the high-frequency pairings are plotted on the two componential analysis diagrams, it can be seen that in Romney's analysis all high-frequency pairings are between terms which differ in only one component. In Wallace and Atkins' analysis, several high-frequency pairings cross more than one component.

The material is presented in Fig. 9 on the following page.

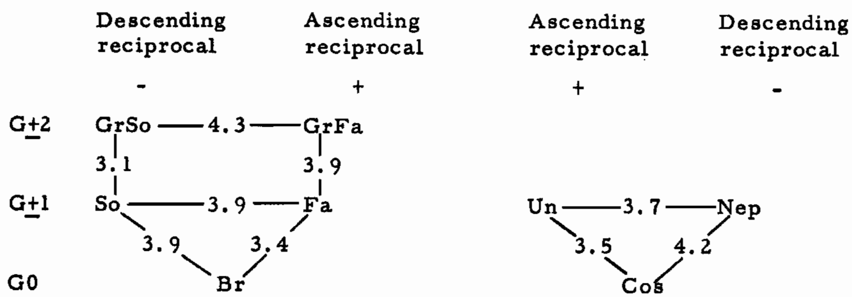
While these results support our assumptions concerning componential analyses, there remain questions which cannot be answered solely by plotting high frequency pairings. First, we might ask if the low and middle frequency pairings also conform to our componential model. In addition, we would like to know if the triad data could be treated in some way so that it would yield directly a cognitive model of American-English kin terms.

Both of these questions can be answered by the use of a multi-dimensional scaling technique described by Torgerson (1958:Ch. 11), developed expressly for the treatment of triadic data. This technique produces a distance model consisting of a set of absolute distances (of undetermined units) between all pairs of stimuli in the universe treated. These distances give the relative location of the stimuli in an n-dimensional space—where n is the minimal number of dimensions needed to define uniquely the geometrical model. It *does not* yield a spatial model, e.g., it does not give the absolute projections of each point on axes referred to a known origin. The distance model is sufficient for our purposes, however, since we need only know the distances between points, and not their absolute locations in the n-dimensional space. (We are indebted to William H. Geoghegan for all calculations for the triad data. He also aided the interpretation and helped to write this section.)

Componential analysis of consanguineal male American kin terms. Adapted from Wallace.



Componential analysis of consanguineal male American kin terms. Adapted from Romney.



Connecting lines indicate terms which were paired together in the triad list with high frequency. Numbers represent mean frequency of pairing.

FIG. 9. Alternate analyses of American kin terms.

The distance model is expressed, in Table VII, as a full set of interpoint distances in matrix form. These distances are generally in inverse relation to the frequency of pairing data presented above. That is, the more frequently any two items are paired together, the less the distance between them. The problem of conceptualization may be simplified considerably with a "picture" of the model that allows visualization. The eight points may be represented in a three dimensional space. If these points were distributed *randomly*, there would be an infinitely high probability that *seven* dimensions would be required to define uniquely their position. By adding the proper constant to the interpoint distances, the dimensionality could be reduced to *six*—no less. So we may regard it as significant when we find that only *three* dimensions are required to define uniquely the interpoint distances of our eight kinship terms.

TABLE VII. INTERPOINT DISTANCES BETWEEN MALE RELATIVES FOR 116 AMERICAN-ENGLISH SUBJECTS (absolute distances estimated with c = 3.6)

	GrFa	GrSo	Fa	So	Br	Un	Ne	Co
GrFa	0	2.696	2.786	3.913	4.288	3.755	4.275	4.448
GrSo		0	3.793	2.881	3.782	4.215	3.572	3.861
Fa			0	2.544	3.248	3.422	4.334	4.344
So				0	2.943	4.205	4.807	3.620
Br					0	3.779	3.733	3.680
Un						0	2.980	3.099
Ne							0	2.801
Co								0

These dimensions correspond to the three components of generational difference, reciprocity, and collaterality. Perhaps it would be more exact to say that the direction of change of reciprocity in the model (ascending to descending) is roughly orthogonal to the direction of change of generation (from zero to one to two); and that the two of these are in turn roughly orthogonal to the direction of change of collaterality (direct to collateral). The modifier "roughly" is used because the position of some of the terms is slightly ambiguous. /Br/, for example, lies halfway between ascending and descending reciprocal, and halfway between direct and collateral. Even so, Fig. 10 below, showing the relative positioning of the terms in a three dimensional space, tentatively confirms the validity of assigning these three dimensions to the model. In Fig. 11 are illustrated the spatial distance models (geometrical constructions) that might ideally be expected from two componential analyses. The first shows the Romney analysis and the second, the Wallace and Atkins version. (The positions shown are *relative*.) It can be seen that the greater correspondence with the mathematical model occurs for the Romney version.

The Romney analysis involves three dimensions, while the Wallace and Atkins version involves only two (since the latter do not consider reciprocity). The mathematical model clearly necessitates the dimension of reciprocity to define the positioning of points.

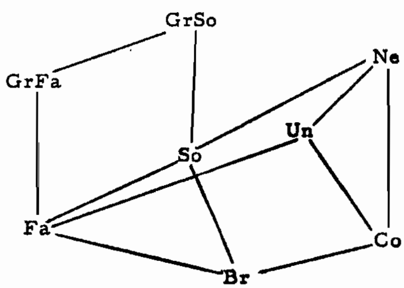


FIG. 10. Spatial representation of male American kin terms from triad data.

In general, the use of sorting procedures as a means of investigating similarity in referential meaning seems to be a potentially effective method. For American-English kin terms, the prediction that the more components any two terms hold in common, the more likely the two terms will be classed together as similar in meaning, was supported. Also, the triad data indicate that subjects use a set of distinctions that are in the main isomorphic with the components uncovered in semantic analyses. Finally, there is some evidence that

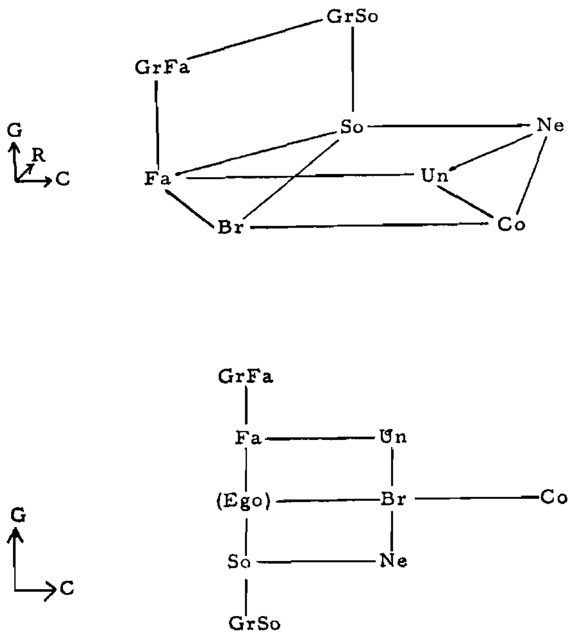


FIG. 11. Spatial representation of male American kin terms from formal analysis.

components have differential strengths in classing together and separating terms.

Further work is necessary to validate the method fully, however. Geoghegan (1963) has shown that the data may be contaminated in various ways; for example, different subjects may have different cognitive models, or connotative as well as denotative meaning may be used by subjects in making their judgments, etc.

SUMMARY AND SPECULATIONS

Beginning with the initial problem of two alternative componential analyses for American-English kinship terms, we have attempted to explore the the cognitive or psychological implications of componential analyses. A series of simple tests have been administered to individual subjects, with the general hypothesis that terms which share components will receive similar responses.

This prediction was based on the assumptions that the components isolated by a formal analysis define the meaning of a term and that an individual's response to a term is affected by that term's meaning. In general, it appears that much of our data supports these assumptions, and that one of the componential analyses fits the data better than the other. However, we also found several areas of psychological interest about which a formal analysis would provide no information whatsoever, such as the saliency of a term as measured by its position in a freely recalled list or by percentage of recall.

A major conclusion of this paper is that people respond to kinship terms as if each term contained a bundle of distinct meanings. Historically, componential analysis was developed to handle exactly this type of situation. We would not need a componential analysis of American-English kinship terms if the terms were morphologically segmented into separate referential meanings. If we had such a system, we might say, "Listen, true-lineal-male-of-first-ascending-generation-ego-speaking-formally, I need the car tonight." In a system of this type, a componential analysis would be superfluous, and an adequate analysis would be to try to state the referent for "true" "lineal," etc.

We call the components of a lexeme its *sememes*. That is, we consider kinship lexemes to be composed of sets of sememes and componential analysis, a means of isolating this set of sememes.

The question of interest here is to ask *how* these sememes become part of the individual's cognitive system. In the psychological lexicon, it would seem that the sememes of kin terms function as *discriminative stimuli* for individuals. Our equation of component or sememe with discriminative stimuli is based on the fact that the test data presented above indicate that individuals make differential responses to the components of kin terms, not just to the unique term. Of course, for kin terms, many of the components are relational in character rather than absolute, which means that the discriminative stimulus consists in these cases of a relational concept, e.g., reciprocity.

The original question can now be rephrased as "how do the sememes of American-English kin terms become discriminative stimuli?" The answer would seem to be that *the sememes are learned as discriminative stimuli through precisely the same set of operations which allows the analyst to uncover components.* That is, a discriminative stimulus is most efficiently learned when a subject is repeatedly presented with events which differ or contrast in one particular feature and in which the subject's responses to the contrastive stimuli are differentially reinforced. What both the individuals who use the native system and the analyst do is learn the set of contrasts which signal a difference (although the reinforcement for the analyst may be only a neat system, while the reinforcement for the individual in the system are approval and understanding). Thus both the analyst and the native speaker learn that only females are *aunts* and only males are *uncles*. Furthermore, both might also be trained to notice that for every "kind of person" who can be an *aunt*, there is an identical (except for sex) "kind of person" who can be an *uncle*.

E.g., "aunt" MoSi, FaSi, MoBrWi, etc.
"uncle" MoBr, FaBr, MoSiHu, etc.

However, not all American-English kin terms have ranges of kin types which match except for one feature. Only those distinctions which in Romney's method of analysis are termed *range-sets* can be matched up in this way. The range of the term *uncle* can be matched to the range of the term *aunt*, but the range of *uncle* cannot be matched to *father*. This difference in the conditions of contrast is perhaps related to the fact that individuals tend to class together in the triad procedure and in the use of the affix "in-law," "step," etc., those terms or sets of terms whose ranges have an exact match expect for one feature. Such sets of terms are not only easy to learn to distinguish, but they are also easy to learn to re-classify together as one unit versus other units. (E.g., *parents* vs. *child*, *sibling* vs. *cousin*, *father* and *son* vs. *uncle* and *nephew*, etc.) Thus, the ease of contrastiveness and regrouping may account for the differential strength of various components in sorting kin terms.

However, from other evidence, the mere fact of repeated presentations of material which differs only in one feature, but which is *not* differentially reinforced, is not enough to train in a discriminative stimulus. For example, although we are repeatedly presented with human faces which differ slightly from left side to right side, we typically fail to notice the asymmetry, since such an easy observation is not contingent on any reinforcement. Both contrastiveness and differential reinforcement seem to be necessary conditions for learning a discriminative stimulus. As a related speculation, we suggest that the differential saliency of various sets of kin terms noted in the listing task is a result of the differential frequency, strength, and type of reinforcement received for using these terms.

A further implication of the notion that componential analysis may isolate discriminative stimuli is that other types of components found in the analysis of non-semantic material, such as the distinctive features of phonemes, or the shape dimensions of orthographies, may also be considered as potential discriminative stimuli. However, simply because the analyst can put together a series of items and find in them a verbalizable set of contrasts does not imply that these contrasts function as discriminative stimuli for any other individual. If the users of these items rarely have the opportunity to place them in contrast, or if there are no reinforcing consequences in doing so, then the analyst has trained himself on a discriminative stimulus which is uniquely his.

Finally, it should be mentioned that persons may learn more discriminative stimuli to class and segregate kin than the contrasts found only in the lexical system. The use of such distinctions as "close" or "nuclear family" is a case in point. Nor are kinship contrasts always so clear that they force all individuals to learn the same simple discriminative stimuli. However, the fact that individuals may develop more discriminative stimuli than the componential analyst finds necessary and the fact that both may face equivocal contrasts, would seem to be a topic for further research.

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