A TRANSFORMATIONAL ANALYSIS OF THE KAPAUKU KINSHIP SYSTEM[1]

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Introduction

Although one of the important subdivisions of American anthropology has always been anthropological linguistics, the theories and methodologies of structural linguistics have, until recently, never been applied to the study of anthropology's main concern, culture. Anthropological linguists have, in the main, been merely linguists who studied and described the languages of rather exotic cultural groups. While these same men often were interested in and described other aspects of the culture also, the methodology used and the theoretical point of view taken were unrelated to their theoretical assumptions about language. For theoretical models to be used for the understanding of culture itself, these investigators turned to other sciences. Evolutionists such as Morgan adopted their theories from the biological sciences. The structure-functionalists traced their intellectual heritage back to the French sociologists; while the Boasians rejected all theoretical models and contented themselves with description and historical reconstruction. Sapir, Whorf, and their followers were, of course, interested in the relationship between language, culture and cognition. They did not analyze culture from the point of view of linguistic theory, however. Rather they attempted to demonstrate the influence of language upon thought and culture.

Recently, however, a number of anthropologists have begun using both contemporary linguistic methodology and theory. (Cf. Romney and D'Andrade 1964a, and Hammel 1965a.) The techniques of analysis of ethnoscience have their basis in the methodology of linguistics. The ethnoscientists are attempting to discover the culturally relevant semantic categories in the society under investigation. To do so, they use linguistic data and linguistic methodology. Their primary concern, however, is not with the language as <u>linguistic data</u>, but, rather, with using language as an avenue for understanding the cognitive categories of the people of the culture being studied and, therefore, understanding the culture itself. The avowed purpose is to describe the culture from the point of view of the participants in that culture in such a way that the description can be replicated by other investigators using the same techniques. It is primarily a methodology for ethnography that has been borrowed from linguistics. As such, it makes few theoretical assumptions and most certainly does not attempt to apply the theories of contemporary, transformational linguistics to cultural data.

The type of kinship analysis done by Romney (1964b), Hammel (1965b), and particularly by Lounsbury (1964 and 1965), however, (though closely related to ethnoscience in its development and referred to by Hammel as componential analysis 1965b) differs in an important respect from the other work utilizing linguistic methods being done in American anthropology. These researchers work with the methodology used in linguistic transformational analysis and much of their theoretical orientation is that of the transformational school of linguistics. What these men are doing essentially is analyzing the formal structure of nonlinguistic aspects of culture. They have used linguistic data such as kinship terminologies, however, what they are in effect analyzing is not the linguistic aspect of the kin terms but rather the internal structuring of the system. Their basic data are both kin terms and kin types. The structure that they discover is one of relationship between the linguistic units, the kin terms, and the kin types which fall within each term. An important aspect of the relationship between kin terms and kin types is the relationship between the kin types themselves. The methodology used to discover this structure is borrowed from the field of linguistics. In one of the early articles which dealt with this type of structural analysis of cultural data, Lounsbury (1956:9) states: "The aim of this paper is to point out a relatively simple problem in semantics which can be analysed by means of techniques analogous to those already developed in linguistics . . ." Both language and at least some other aspects of culture, then, can be analyzed by means of similar techniques. The point we wish to make here is that both culture and language may be analyzed by using similar methodologies because they are structured in much the same manner. To demonstrate this and to exemplify the techniques used in this type of work, we shall analyse the formal structure of the kinship system of the Kapaukans using data collected by Pospisil (1960).

A Transformational Analysis of Kapauku Kinship Terminology

The Notation and the Calculus

Transformational analysis of kinship systems requires a system of notation which is more primitive than the one traditionally used. Hammel (1965b) and Romney (1964b) have developed a notational system which fills this need. Although the system still has limitations, it is superior to the one that has been used in the past in that it indicates each biological factor in the expression. For example, in the old notation "brother," which contains two biological elements, was indicated by the single letter "B." Under the new system "brother" is indicated by three symbols; one which indicates the sex of ego if it is relevant, one which indicates a sibling link, and one which indicates that the sibling is male. The notation employed here includes four operators and eight elements.

Notation

Operators:

+	indicates a step up by one generation.
-	indicates a step down by one generation.
=	indicates an affinal link.
0	indicates a sibling link.

Elements:

a	indicates an individual of any sex.
b,c	indicates an individual of any sex provided that the sex indicated by (b) is different from the sex indicated by (c).
d	indicates an individual of any sex provided that all of the (d's) in any one expression indicate persons of the same sex.
m	indicates an individual of male sex.
f	indicates an individual of female sex.
e	as superscript indicates elder than ego.
y	as superscript indicates younger than ego.

Logical Statements:

> indicates "transforms to."
< indicates "transforms from."
(Some of the statements in this analysis are bi-directional, i.e. of the form, < >.)

Examples:

MFB (any sex ego) is written as a+f+mOm: FFZS;
(male speaking) is written as m+m+mOf-m;
sibling of the same sex is written as dOd;
sibling of the opposite sex is written as bOc;
parent (any sex ego) is written as a+a, etc.

Comments:

The Kapauku are a patrilineal, polygynous society. From the data given by Pospisil, it seems clear that children of the same father are considered to be full siblings. The sibling link may, therefore, be written redundantly as +m-. The expressions a=a... and ...a=a appear in the analysis. These are to be read as indicating two individuals of opposite sex who are spouses.

Rules

I. a>b, c, d, f, m but the reverse is not true.
b,c,d>f,m (subject to the definitions of b,c, and d) but the reverse is not true.
(Rule I is a substitution rule for elements, not a transformational rule.)

II. d>+d->dOd (For any element, substitute a sibling of the same sex as that element.)
(a) restriction--this rule does not apply to the d of d=... or ...=d of affinal expressions.

III. O>+aOa- (For a sibling operator, go up one generation, substitute a pair of siblings of any sex, and then come down one generation.)
(a) restriction--this rule does not apply to expressions which contain an O operator but no other operators.

IV. /R/ (Read the expression backwards, from right to left, and change all + operators to - operators and vice versa. This rule may be termed a rule of reciprocity.)
(a) restriction--this rule cannot be applied to expressions or roots containing one - operator and no other operators.
(b) restriction--this rule cannot be applied to expressions which contain an elder or younger distinction.
(c) restriction--this rule cannot be applied to roots which end with ...+dOd.
(Restriction (c) is not necessary for certain expressions. In such cases, however, the proper expansions can be reached even though the restriction is employed. Since it is necessary for the proper expansion of other roots, it is presented in its present form without further qualifications for the sake of parsimony.)

V. ...b >...c=b (For any terminal element of a specific sex substitute an element of the opposite sex and a spouse of the substituting

element.)
(a) restriction--this rule can only be applied to roots which contain at least two + operators or one + operator and one = operator, and no other kinds of operators.
(b) restriction--this rule cannot be applied to affinal kin of 0 generation. [Rule VI makes this restriction necessary.]

VI. b=c+a>b=cOb (For any parent of a spouse, substitute a sibling of the opposite sex from that spouse.)
(a) restriction--this rule can only be applied when b=c+a occurs by itself.

General Restriction

None of the above rules can be applied to expressions which contain one + or one = operator and no other operator.

Roots and Expansions

In Table I, the root expressions, as defined above, are listed along with the Kapauku kin term. The number before each term corresponds to Pospisil's number for the term. In the second column, the expansions are listed. The rule or rules which have been applied to the root to generate the expression are given in the third column.

It should be stated at this point that Pospisil does not present his data by giving the kin term and listing the kin types under it. Rather, he describes the types which fall under the term and gives several examples. All of the expressions which have been generated by application of the rules in Table I from any particular term and root conform to his description of that term and expression set. Unfortunately, Pospisil does not state the collateral limits of his kin terms but merely indicates that they may be extended to any degree of collaterality. Presumably, this means that anyone to whom ego can trace an actual genealogical relationship is called by some one of the kin terms listed. For practical reasons, the expansions in Table I go no farther than the farthest removed kinsman from ego given by Pospisil in his examples for that term. By further application of the rules of transformation, however, all individuals that could possibly exist in any ego's kinship universe could be generated under the proper term. Column four gives the number of the term under which compliments of the term in question occur. Column five gives the number of the term with which the term in question overlaps.

In column three, when two rules appear it means that the rule on the left has been applied to the expression which has been generated by application of the rule on the right to the root expression. The same principle applies to lists of more than two rules; i.e. apply the rule to the right to the root, then apply the next rule to the left on the resultant expression, and so on.

Expansions which are redundant (e.g. a+aOa+a+aOa+a) have not been generated in Table I unless they are a necessary preliminary step to further expansions.

Table I

Term and Root	Expansions	Rule	Complements in	Overlaps with
(1) Ani Pigoka a+a+a+a+a	2^5=32 expressions under rule I, e.g. m+m+m+m+m, f+f+m+f+m, m+m+f+m+f, etc.	I	(1)	
	a-a-a-a-a	IV	(1)	
	2^5=32 expressions when rule I is applied after rule IV has been applied, e.g. f-f-f-f-f, m-f-m-f-m, m-m-m-m-m, etc.	I, IV		
	a+a+a+a+aOa	II	(1)	
	2^6=64 expressions when rule I is applied, e.g. m+m+m+m+mOm, f+m+f+m+fOm, f+f+f+f+mOf, etc.	I, II		
	aOa-a-a-a-a	IV, II	(1)	
	2^6=64 expressions when rule I is applied, e.g. mOf-m-f-f-f, etc.	I, IV, II		
	a+a+a+a+a+aOa-a	III, II	(1)	
	2^8=256 expressions when rule I is applied, e.g. m+m+m+m+m+mOm-m, f+m+f+m+f+mOf-f, etc.	I, III, II		
	a+aOa-a-a-a-a-a	III, IV, II	(1)	
	2^8=256 expressions when rule I is applied, e.g. m+mOm-m-m-m-m-m, f+mOf-m-f-m-f-m, etc.	I, III, IV, II		
	a+a+a+a+a=a*	V	(1) (22)	(22)
	2^5=32 expressions when rule I is applied, e.g. m+m+m+m+m=f, f+m+f+m+f=m, etc. (This is not 2^6 since the a to the left of the = operator defines what the final a will be.)	I, V		
	a-a-a-a-a=a	V, IV	(1) (22)	(22)

*This expression is not redundant since the Kapauku are polygynous and this individual may be one of grandmother's co-wives rather than grandmother.

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(1) Ani Pigoka a+a+a+a+a (Cont.)	2^5=32 expressions when rule I is applied, e.g. m-m-m-m-m=f, m-f-m-f-f=m, etc.	I, V, IV		
	a+a+a+a+aOa=a	V, II	(1) (22)	(22)
	2^6=64 expressions when rule I is applied, e.g. m+m+m+m+mOm=f, m+f+m+f+mOf=m, etc.	I, V, II		
	aOa-a-a-a-a=a	V, IV, II	(1) (22)	(22)
	2^6=64 expressions when rule I is applied, e.g. fOm-m-m-m-m-m=f, mOm-f-m-f-m-f=m, etc.	I, V, IV, II		
	a+a+a+a+a+aOa-a=a	V, III, II	(1) (22)	(22)
	2^8=256 expressions when rule I is applied, e.g. m+m+m+m+m+mOm-m=f, m+f+m+f+m+fOm-f=m, etc.	I, V, III, II		
	a+aOa-a-a-a-a-a=a	V,III,IV,II	(1) (22)	(22)
	2^8=256 expressions when rule I is applied, e.g. m+mOm-m-m-m-m-m=f, m+fOm-f-m-f-m-f=m, etc.	I,V,III,IV,II		
	a=a-a-a-a-a	IV, V	(1) (22)	(22)
	2^5=32 expressions when rule I is applied.			
	a=a+a+a+a+a	IV, V, IV	(1) (22)	(22)
	2^5=32 expressions when rule I is applied.			
	a=aOa-a-a-a-a	IV, V, II	(1) (22)	(22)
	2^6=64 expressions when rule I is applied.			
	a=a+a+a+a+aOa	IV,V,IV,II	(1) (22)	(22)
	2^6=64 expressions when rule I is applied.			
	a=a+aOa-a-a-a-a-a	IV,V,III,II	(1) (22)	(22)
	2^8=256 expressions when rule I is applied.			

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(1) Ani Pigoka a+a+a+a+a (Cont.)	a=a+a+a+a+a+aOa-a 2^8=256 expressions when rule I is applied.	IV,V,III,IV, II	(1) (22)	(22)
	a=a-a-a-a-a=a 2^5=32 expressions when rule I is applied.	V, IV, V	(1) (22)	(22)
	a=a+a+a+a+a=a 2^5=32 expressions when rule I is applied.	V, IV, V, IV	(1) (22)	(22)
	a=aOa-a-a-a-a=a 2^6=64 expressions when rule I is applied.	V, IV, V, II	(1) (22)	(22)
	a=a+a+a+a+aOa=a 2^6=64 expressions when rule I is applied.	V,IV,V,IV,II	(1) (22)	(22)
	a=a+aOa-a-a-a-a-a=a 2^8=256 expressions when rule I is applied.	V,IV,V,III,II	(1) (22)	(22)
	a=a+a+a+a+a+aOa-a=a 2^8=256 expressions when rule I is applied.	V,IV,V,III, IV,II	(1) (22)	(22)
(2) Ani aija a+a+a+a	2^4=16 expressions when rule I is applied to root.	I	(2)	
	a-a-a-a 2^4=16 expressions when rule I is applied.	IV	(2)	
	a+a+a+aOa 2^5=32 expressions when rule I is applied.	II	(2)	
	aOa-a-a-a 2^5=32 expressions when rule I is applied.	IV, II	(2)	
	a+a+a+a+aOa-a 2^7=128 expressions when rule I is applied.	III, II	(2)	

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(2) Ani aija a+a+a+a (Cont.)	a+aOa-a-a-a-a 2^7=128 expressions when rule I is applied.	III, IV, II	(2)	
	a+a+a+a=a 2^4=16 expressions when rule I is applied.	V	(2) (22)	(22)
	a-a-a-a=a 2^4=16 expressions when rule I is applied.	V, IV	(2) (22)	(22)
	a+a+a+aOa=a 2^5=32 expressions when rule I is applied.	V, II	(2) (22)	(22)
	aOa-a-a-a=a 2^5=32 expressions when rule I is applied.	V, IV, II	(2) (22)	(22)
	a+a+a+a+aOa-a=a 2^7=128 expressions when rule I is applied.	V, III, II	(2) (22)	(22)
	a+aOa-a-a-a-a=a 2^7=128 expressions when rule I is applied.	V,III,IV,II	(2) (22)	(22)
	a=a-a-a-a 2^5=32 expressions when rule I is applied.	IV, V	(2) (22)	(22)
	a=a+a+a+a 2^4=16 expressions when rule I is applied.	IV, V, IV	(2) (22)	(22)
	a=aOa-a-a-a 2^5=32 expressions when rule I is applied.	IV, V, II	(2) (22)	(22)
	a=a+a+a+aOa 2^5=32 expressions when rule I is applied.	IV,V,IV,II	(2) (22)	(22)
	a=a+aOa-a-a-a-a 2^7=128 expressions when rule I is applied.	IV,V,III,II	(2) (22)	(22)

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(2) Ani aija a+a+a+a (Cont.)	a=a+a+a+a+a0a-a 2^7=128 expressions when rule I is applied.	IV,V,III,IV, II	(2) (22)	(22)
	a=a-a-a-a=a 2^4=16 expressions when rule I is applied.	V, IV, V	(2) (22)	(22)
	a=a+a+a+a=a 2^4=16 expressions when rule I is applied.	V, IV, V, IV	(2) (22)	(22)
	a=a0a-a-a-a=a 2^5=32 expressions when rule I is applied.	V, IV, V, II	(2) (22)	(22)
	a=a+a+a+a0a=a 2^5=32 expressions when rule I is applied.	V,IV,V,IV,II	(2) (22)	(22)
	a=a+a0a-a-a-a-a=a 2^7=128 expressions when rule I is applied.	V,IV,V,III,II	(2) (22)	(22)
	a=a+a+a+a+a0a-a=a 2^7=128 expressions when rule I is applied.	V,IV,V,III, IV,II	(2) (22)	(22)
(3) Ani muuma a+a+a	2^3=8 expressions under rule I.	I	(3)	
	a-a-a 2^3=8 expressions when rule I is applied.	IV	(3)	
	a+a+a0a 2^4=16 expressions when rule I is applied.	II	(3)	
	a0a-a-a 2^4=16 expressions when rule I is applied.	IV, II	(3)	
	a+a+a+a0a-a 2^6=64 expressions when rule I is applied.	III, II	(3)	

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(3) Ani muuma a+a+a (Cont.)	a+aOa-a-a-a 2^6=64 expressions when rule I is applied.	III, IV, II	(3)	
	a+a+a=a 2^3=8 expressions when rule I is applied.	V	(3) (22)	(22)
	a-a-a=a 2^3=8 expressions when rule I is applied.	V, IV	(3) (22)	(22)
	a+a+aOa=a 2^4=16 expressions when rule I is applied.	V, II	(3) (22)	(22)
	aOa-a-a=a 2^4=16 expressions when rule I is applied.	V, IV, II	(3) (22)	(22)
	a+a+a+aOa-a=a 2^6=64 expressions when rule I is applied.	V, III, II	(3) (22)	(22)
	a+aOa-a-a-a=a 2^6=64 expressions when rule I is applied.	V,III,IV,II	(3) (22)	(22)
	a=a-a-a 2^3=8 expressions when rule I is applied.	IV, V	(3) (22)	(22)
	a=a+a+a 2^3=8 expressions when rule I is applied.	IV, V, IV	(3) (22)	(22)
	a=aOa-a-a 2^4=16 expressions when rule I is applied.	IV, V, II	(3) (22)	(22)
	a=a+a+aOa 2^4=16 expressions when rule I is applied.	IV,V,IV,II	(3) (22)	(22)
	a=a+aOa-a-a-a 2^6=64 expressions when rule I is applied.	IV,V,III,II	(3) (22)	(22)

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(3) Ani muuma a+a+a (Cont.)	a=a+a+a+aOa-a 2^6=64 expressions when rule I is applied.	IV,V,III,IV, II	(3) (22)	(22)
	a=a-a-a=a 2^3=8 expressions when rule I is applied.	V, IV, V	(3) (22)	(22)
	a=a+a+a=a 2^3=8 expressions when rule I is applied.	V, IV, V, IV	(3) (22)	(22)
	a=aOa-a-a-a=a 2^4=16 expressions when rule I is applied.	V, IV, V, II	(3) (22)	(22)
	a=a+a+aOa=a 2^4=16 expressions when rule I is applied.	V,IV,V,IV,II	(3) (22)	(22)
	a=a+aOa-a-a-a=a 2^6=64 expressions when rule I is applied.	V,IV,V,III,II	(3) (22)	(22)
	a=a+a+a+aOa-a=a 2^6=64 expressions when rule I is applied.	V,IV,V,III, IV,II	(3) (22)	(22)
(4) Naama a+fOm	f+fOm m+fOm	I	(4)	
	a+f+aOa-m 2^3=8 expressions when rule I is applied, e.g. f+f+fOf-m, m+f+mOf-m, etc.	III	(4)	
	mOf-a mOf-f mOf-m	IV I	(4)	
	m+aOa-f-a 2^3=8 expressions when rule I is applied.	IV, III	(4)	
	a+f+a+aOa-a-m 2^5=32 expressions when rule I is applied.	III, III	(4)	

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(4) Naama a+fOm (Cont.)	m+a+aOa-a-f-a[a] 2^5=32 expressions when rule I is applied.	IV, III, II	(4)	
(5) Ani ooka a+mOf	f+mOf m+mOf (Further expansion parallels that of 4, with complements, however found in 5.)	I	(5)	
(6) Ani joka d-a	m-m m-f f-m f-f	I	(7, 9)	
	dOd-a mOm-m mOm-f fOf-m fOf-f	II I, II	(8, 10)	
	a+aOa-d-a 2^4=16 expressions when rule I is applied. (This is not 2^5 since the sex of the first d determines the sex of the second d.)	III, II	(8, 10)	
	d+a+aOa-a-d-a 2^6=64 expressions when rule I is applied.	III, III, II	(8, 10)	
(7) Niikai a+f	m+f f+f (No expansions are possible due to the general restriction given previously.)	I	(6)	
(8) Niika[b] a+fOf	m+fOf f+fOf	I	(6)	

[a]This term and many of the terms to follow may be extended to further degrees of collaterality. As previously stated, however, expansions in this paper will only be carried out as far as Pospisil's examples.

[b]This term is also applied to stepmother. All of stepmother's relatives are called by the pertinent kinship terms for true maternal relatives.

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(8) Niika a+fOf (Cont.)	a+f+aOa-f	III	(6)	
	2^3=8 expressions when rule I is applied.			
(9) Naitai a+m	m+m f+m (No expansions are possible due to general restriction.)	I	(6)	
(10) Naita a+mOm	m+mOm f+mOm (Further expansion parallels that of 8, with complements in 6.)	I	(6)	
(11) Noone a+bOc-a	2^3=8 expressions when rule I is applied.		Self-reciprocal	
	a+b+aOa-c-a	III	Self-reciprocal	
	2^5=32 expressions when rule I is applied.			
	a+b+a+aOa-a-c-a	III, III	Self-reciprocal	
	2^7=128 expressions when rule I is applied.			
(12) Ani ijoka a+fOf-a	m+fOf-m m+fOf-f f+fOf-f f+fOf-m	I	Self-reciprocal	
	a+f+aOa-f-m	III	Self-reciprocal	
	2^3=8 expressions when rule I is applied.			
(13) Ani paneka b+m-c	m+m-f[a] f+m-m	I	Self-reciprocal	
	b+mOm-c m+mOm-f f+mOm-m	I I, II	Self-reciprocal	
	b+m+aOa-m-c	III	Self-reciprocal	
	2^3=8 expressions when rule I is applied.			

[a]Redundant for mOf.

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(14) Ani Weneka d+m-d^{y}	m+m-m^{y} f+m-f^{y}	I	(15, 16)	
	d+mOm-d^{y} m+mOm-m^{y} f+mOm-f^{y}	II I, II	(15, 16)	(17)
	d+m+aOa-m-d^{y}	III, II	(15, 16)	(17)
	2^3=8 expressions when rule I is applied.			
(15) Nauwa m+m-m^{e}	m+m-m^{e}		(14)	
	m+mOm-m^{e}	II	(14)	(17)
	m+m+aOa-m-m^{e}	III, II	(14)	(17)
	2^2=4 expressions when rule I is applied.			
(16) Anibai f+m-f^{e}	f+m-f^{e}		(14)	
	f+mOm-f^{e}	II	(14)	(17)
	f+m+aOa-m-f^{e}	III, II	(14)	(17)
	2^2=4 expressions when rule I is applied.			
(17) Anepa d+mOm-d	m+mOm-m[a] f+mOm-f	I	Self-reciprocal	(14,15, 16)
	d+m+aOa-m-d	III	Self-reciprocal	(14,15, 16)
	2^3=8 expressions when rule I is applied.			
(18) Ani wapi a+aOf=m	m+mOf=m m+fOf=m f+fOf=m f+mOf=m	I	(18)	
	m=fOa-a m=fOm-m m=fOm-f m=fOf-f m=fOf-m	IV I, IV	(18)	
	a+a+aOa-f=m	III	(18)	
	2^3=8 expressions when rule I is applied.			

[a]Kinship terms 1-17 are extended to close relatives of the speaker's best friend.

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(18) Ani wapi a+aOf=m (Cont.)	m=f+aOa-a-a	IV, III	(18)	
	2^3=8 expressions when rule I is applied.			
(19) Naamai a+aOm=f	m+mOm=f m+fOm=f f+fOm=f f+mOm=f	I	(19)	
	f=mOa-a	IV	(19)	
	f=mOm-m f=mOm-f f=mOf-f f=mOf-m	I, IV		
	a+a+aOa-m=f	III	(19)	
	2^4=16 expressions when rule I is applied.			
	f=m+aOa-a-a	IV, III	(19)	
	2^4=16 expressions when rule I is applied.			
(20) Ani waka b=c	f=m m=f (No other rules apply.)	I	Self-reciprocal	
(21) Ani geeka bOb=c	mOm=f fOf=m	I	(21)	
	c=bOb	IV	(21)	
	f=mOm m=fOf	I, IV		
	b+aOa-b=c	III	(21)	
	2^3=8 expressions when rule I is applied.			
	c=b+aOa-b	IV, III	(21)	
	2^3=8 expressions when rule I is applied.			
(22) Ani baaka b=c(+a)^{n}*	b=c+a		(22)	
	b=c+a+a		(22, 3)	(3)
	b=c+a+a+a, etc.		(22, 2)	(2)
	b=c+aOa	II	(22)	

*The n superscript indicates that +a may be added any number of times to the right of the expression.

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(22) Ani baaka $b=c(+a)^n$ (Cont.)	$2^3=8$ expressions when rule I is applied.			
	b=c+a+a0a	II	(22, 3)	(3)
	$2^4=16$ expressions when rule I is applied.			
	b=c+a+a+a0a	II	(22, 2)	(2)
	$2^5=32$ expressions when rule I is applied.			
	a-c=b	IV	(22)	
	a-a-c=b		(22, 3)	(3)
	a-a-a-c=b, etc.		(22, 2)	(2)
	b=c+a+a0a-a	III, II	(22)	
	$2^5=32$ expressions when rule I is applied.			
	a0a-c=b	II, IV	(22)	
	$2^3=8$ expressions when rule I is applied.			
	a0a-a-c=b	II, IV	(22, 3)	(3)
	$2^4=16$ expressions when rule I is applied.			
	a0a-a-a-c=b	II, IV	(22, 2)	(2)
	$2^5=32$ expressions when rule I is applied.			
	b=c0b	VI	(22)	
	f=m0f	I, VI		
	m=f0m			
	b0c=b	IV, VI	(22)	
	f0m=f	I, IV, VI		
	m0f=m			
	b=c+a0a=a	V, II	(22)	
	$2^3=8$ expressions when rule I is applied.			
	a=a0a-c=b	IV, V, II	(22)	
	$2^3=8$ expressions when rule I is applied.			
	b=c+a+a0a-a=a	V, III, II	(22)	
	$2^5=32$ expressions when rule I is applied.			

Table I Continued

Term and Root	Expansions	Rule	Complements in	Overlaps with
(22) Ani baaka $b=c(+a)^n$ (Cont.)	(Many further expansions are possible under this root. Pospisil gives no further examples, however.)		Complements of these would be in (22, 1.)	Would overlap with (1)
(23) Ani-geeto a=aOa=a	m=fOf=m f=mOm=f m=fOm=f f=mOf=m	I	Self-reciprocal	
	a=a+aOa-a=a $2^4=16$ expressions when rule I is applied.	III	Self-reciprocal	

Conclusion

The preceding formal analysis illustrates a number of points, the most important of which are that the Kapauku kinship system does have a structure and that this structure can be analyzed by using a methodology which is analogous to that used by transformational linguistics for the analysis of language.

Transformational theory views language as consisting of two interrelated levels; the deep structure, and the surface structure (cf. Chomsky 1965). As Chomsky points out, it is the central idea of transformational grammar that these two levels are distinct and that the surface structure is determined by the application of grammatical transformations to the deep structure. The deep structure of a language consists of a highly restricted (perhaps finite) set of basic strings. The basic strings are made up of elementary units, termed by Chomsky base phrase-markers, which are combined and related by a system of rules. That is to say, basic strings (the underlying deep structure of particular sentences) are generated by the application of rules to base phrase-markers. Each of these sequences is the basis of the sentence that it underlies. Surface structures are formed by the application of grammatical transformations to these basic strings.

Perhaps we can put it more simply without distorting Chomsky's basic points if we say that each sentence of a language has an underlying structure. The sentence itself is (in a spoken language) a string of sounds. That is to say, it is a physical occurrence. It takes the form that it does as the result of certain formal transformational rules that have been applied to the underlying deep structure.

A particular sentence's deep structure, on the other hand, is the structure which underlies the surface structure. Sentences are physically manifested by the application of a limited number of transformational rules to a restricted number of basic strings.

It should be clear that the preceding analysis of a kinship system is directly comparable to a transformational analysis of a language. Three basic elements have been delineated: root kin types, rules of expansion, and expansions. These features are analogous to the linguistic features of deep structure, transformational rules, and surface structure.

The basic strings of a language and the core kin types of a kinship system are both restricted in number. Both are also further analyzable; the basic strings in terms of phrase-marker rules (Chomsky 1965:17) and the core kin types in terms of componential analysis (see Goodenough 1956). By the application of transformational rules to the deep structure of either a sentence or a kin term, the surface structure is generated. In our formal kinship analysis we have applied six transformational rules to twenty-three basic strings and have generated all of the possible kin types for each term. We have accounted for a large body of data by application of a few simple rules of transformation to a limited number of basic elements.

Now, it has already been pointed out above that this type of formal analysis of kinship systems has been done by others and that these researchers have stressed their reliance on linguistic methodology. The clear analogy between this type of analysis and linguistic transformational analysis has never been explicitly stated, however. It is not merely a case of nominalism to talk about kinship systems in the same way that linguists talk about languages. Since both bodies of data are amenable to one kind of analysis, the use of the same terminology is logical and can lead to the application of method and theory in one discipline to data in the other. Moreover, linguistic methodology and theory can be applied to more areas of culture than kinship terminologies. Frake (1964) has done this in the area of religious behavior and Pospisil (1965) to the classification of geographical features, to name two recent examples. There is no reason to suppose that all of culture cannot be analyzed in terms of this type of methodology and theory.

NOTE

[1]I should like to thank Dr. E. A. Hammel for his helpful comments concerning the formal analysis part of this paper. He, of course, is not responsible for any of its shortcomings.

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