The Use of Matrix Technique in an Analysis of Atta Personal Pronouns

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OF ATTA[1] PERSONAL PRONOUNS

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0. Introduction. All Philippine languages have multiple pronoun sets, differing in distribution within the clause, and differing in internal complexity. Traditionally,[2] pronoun sets have been listed and their distribution stated, but few attempts have been made to describe their internal structuring. Smearing of morpheme boundaries has made conventional morpheme analysis of the pronouns a difficult and often unproductive exercise.[3] It will be demonstrated in this paper, however, that by using the techniques of matrix permutation and conflation,[4] the ranking of pronouns and a display of their internal structure is entirely possible. The purpose of this paper is, first, to demonstrate how this was accomplished for the Atta pronouns, and second, to show how on the basis of these matrices meanings can be attributed to each of the pronoun formatives.[5]

1. Permutation and Conflation. First a conventional listing of Atta pronouns is given. Then, stages in the matrix permutations

of the pronouns are described, and finally the resultant matrix is conflated to reveal ranking of the pronouns and the patterning of their formatives.

1.1 Listing of Pronouns. Four sets of personal pronouns occur in Atta. [6] Set I pronouns occur as topic of a clause, Set II as source, Set III as oblique, and Set IV as emphasis (see Matrix 1). In the matrices person 1 represents speaker when singular, speaker and companion(s) when plural. Person 1, 2 represents speaker and addressee in the singular; speaker, addressee, and companion(s) of either or both in the plural. [7] Person 2 represents addressee in the singular, addressees in the plural. Persona 3 represents referent when singular, referents when plural. Matrix 1 consists of a conventional listing of the pronouns.

Matrix 1. [8]

	Singular	Plural
Set I		
1	aq	kami
1, 2	itta	ittam
2	ka	kayu
3	#	ira
Set II		
1	ku	mi
1, 2	ta	tam
2	mu	naw
3	na	da
Set III		
1	nikaan	nikami
1, 2	nitta	nittam
2	nikaw	nikayu
3	kuna	nira
Set IV		
1	sikaan	sikami
1, 2	sitta	sittam
2	sikaw	sikayu
3	aggina	aggira

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1. 2 Stages in Pronoun Matrix Permutation. [9] From the above listing of the pronouns Matrix 2a was set up. The four sets form the columns; person forms the rows with singular persons grouped preceding plural persons. The formatives ni in Set III and si in Set IV become apparent in Matrix 2a and these formatives are shown in the abstracted formative matrix 2b. However, the ni block of III is broken by the occurrence of ku in s3 and the si block of IV is broken by ag in s3 and p3.

Matrix 2a.

		I	II	III	IV
s					
	1	aq	ku	nikaan	sikaan
	1, 2	itta	ta	nitta	sitta
	2	ka	mu	nikaw	sikaw
	3	#	na	kuna	aggina
p					
	1	kami	mi	nikami	sikami
	1, 2	ittam	tam	nittam	sittam
	2	kayu	naw	nikayu	sikayu
	3	ira	da	nira	aggira

Matrix 2b.

		III	IV
s			
	1	ni	si
	1, 2	ni	si
	2	ni	si
	3	ku	ag
p			
	1	ni	si
	1, 2	ni	si
	2	ni	si
	3	ni	ag

In order to bring the s̲i̲, n̲i̲, a̲g̲, and k̲u̲ formatives into
unbroken blocks, Matrix 2a was then rearranged so that the singular
and plural categories appear in columns instead of rows (Matrix 3a).
This brings together the n̲i̲ block in Set III, all persons except s3,
which itself forms a block of k̲u̲; the s̲i̲ block in Set IV, persons 1,
1, 2, and 2; and the ag block in Set IV, person 3 (see abstracted
formative matrix 3b).

Matrix 3a.

		I	II		III		IV	
		s p	s	p	s	p	s	p
1	aq	kami	ku	mi	nikaan	nikami	sikaan	sikami
1, 2	itta	ittam	ta	tam	nitta	nittam	sitta	sittam
2	ka	kayu	mu	naw	nikaw	nikayu	sikaw	sikayu
3	#	ira	na	da	kuna	nira	aggina	aggira

Matrix 3b.

	III		IV	
	s	p	s	p
1	ni	ni	si	si
1, 2	ni	ni	si	si
2	ni	ni	si	si
3	ku	ni	ag	ag

Having observed the patterns of pronoun-initial formatives
in the columns of Matrix 3a, patterns were then seen emerging in
pronoun-ending formatives in the rows, for example the formatives
t̲a̲ alternating with t̲a̲m̲ in person 1, 2, and the d̲a̲ and n̲a̲ formatives
in person 3. Since these cannot be as readily seen in rows as in
columns, it is advantageous to permute Matrix 3a so that the
persons are shown in columns and the sets in blocks of singular
and plural are shown in rows (Matrix 4a). Notice also the regrouping
of the singulars and plurals together, destroying for the moment
the previous blocks of s̲i̲, n̲i̲, a̲g̲, and k̲u̲, but bringing together new
like-formatives. These formatives are seen in Matrix 4b.

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Matrix 4a.

	1	1, 2	2	3
s				
I	aq	itta	ka	#
II	ku	ta	mu	na
III	nikaan	nitta	ñikaw	kuna
IV	sikaan	sitta	sikaw	aggina
p				
I	kami	ittam	kayu	ira
II	mi	tam	naw	da
III	nikami	nittam	nikayu	nira
IV	sikami	sittam	sikayu	aggira

Matrix 4b.

	1	1, 2	2	3
s				
I		ta		
II		ta	u	na
III	an	ta	w	na
IV	an	ta	w	na
p				
I	mi	ta|m	u	ra
II	mi	ta|m	w	da*
III	mi	ta|m	u	ra
IV	mi	ta|m	u	ra

*The ra alternating with da occurs as a result of a morphophonemic change in which d becomes r following vowels.

A formative ka was then noted appearing interior in the composites of some cells of persons 1 and 2 vectors. To group these in a block, and also to place into adjacent columns the

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formative blocks already identified, Matrix 4a was permuted to
group singular and plural with each person, and to cause person
1, 2 singular and plural to appear between person 2 and person 3.
This brings the ka block to the left of the matrix, occurring in
persons 1 and 2 (Matrix 5a).

At this stage two more formatives may be identified and
placed with ka in abstracted formative matrix 5b. These are t
(occurring as the final consonant of the first syllable of each of
the bisyllabic pronouns of 1, 2 person), and g (occurring as the
first consonant of the interior syllables of person 3 of Set IV).

Matrix 5a.

	1		2		1, 2		3	
	s	p	s	p	s	p	s	p
I	aq	kami	ka	kayu	itta	ittam	#	ira
II	ku	mi	mu	naw	ta	tam	na	da
III	nikaan	nikami	nikaw	nikayu	nitta	nittam	kuna	nira
IV	sikaan	sikami	sikaw	sikayu	sitta	sittam	aggina	aggira

Matrix 5b.

	1		2		1, 2		3	
	s	p	s	p	s	p	s	p
I					t	t		
II								
III	ka	ka	ka	ka	t	t		
IV	ka	ka	ka	ka	t	t	g	g

Examination of any of the preceding matrices reveals that
Sets III and IV are more complex than Set I, and Set I in turn is more
complex than Set II. A ranking of complexity becomes evident,
suggesting the possibility of implications in the semantic analysis. [10]
In order to show clearly the ranking of complexity the rows I and II
were interchanged (Matrix 6).

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<u>Matrix 6.</u>

	1		2		1, 2		3	
	s	p	s	p	s	p	s	p
II	ku	mi	mu	naw	ta	tam	na	da
I	aq	kami	ka	kayu	itta	ittam	#	ira
III	nikaan	nikami	nikaw	nikayu	nitta	nittam	kuna	nira
IV	sikaan	sikami	sikaw	sikayu	sitta	sittam	aggina	aggira

It may be noted that columns 1p, 1, 2s, and 3p in Matrix 6 are more regular than the other columns in that the final syllable remains the same throughout the four sets. In Matrix 7 the regular columns are grouped on the left half of the matrix. In addition the rows are inverted to display a different perspective with greatest complexity appearing in the top row, least complexity in the bottom row.

<u>Matrix 7.</u>

	1p	1, 2s	1, 2p	3p	1s	2s	2p	3s
IV	sikami	sitta	sittam	aggira	sikaan	sikaw	sikayu	aggina
III	nikami	nitta	nittam	nira	nikaan	nikaw	nikayu	kuna
I	kami	itta	ittam	ira	aq	ka	kayu	#
II	mi	ta	tam	da	ku	mu	naw	na

By Matrix 7 a grouping of regular columns was achieved. It has lost however the regularity of rows with <u>ka</u> as seen in Matrix 5a and 5b. Because of the desire to preserve both the column regularity of Matrix 7 and the row regularity of Matrix 5, Matrix 8 was set up, in which the plural was placed before the singular with each person.

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	1		2		1, 2		3	
	p	s	p	s	p	s	p	s
IV	sikami	sikaan	sikayu	sikaw	sittam	sitta	aggira	aggina
III	nikami	nikaan	nikayu	nikaw	nittam	nitta	nira	kuna
I	kami	aq	kayu	ka	ittam	itta	ira	#
II	mi	ku	naw	mu	tam	ta	da	na

1.3. Conflation. Having found by permutation all the apparent formative blocks in the matrices, including single-cell blocks containing ideal particles, [11] a conflation of the formative blocks of Matrix 8 was made in Matrix 9 to portray the patterning and field structure of Atta personal pronouns.

Matrix 9. Field Structure of Atta Personal Pronouns.

2. Semantic Microanalysis. Matrix 9 contains two complex-
ities relevant to semantic description: (1) The columns are composed
of two types of lexical categories--person and number. (2) The rows
contain not lexical categories, but structural categories.

2.1 Formatives for Person and Number. The simplest of
the pronoun sets is Set II, which contains the semantic components
of person and number. The pronouns of Set II (represented by one
hyphen each in the bottom row of Matrix 9) are enclosed by only
one block each, with the exception of person 1, 2p, which is also
enclosed by an interior m block. Several of these blocks, i.e.,
1p (mi), 1, 2p (ta and m), 1, 2s (ta), and 3p (da), extend vertically
without a break throughout the four sets of pronouns. The formatives
in these vertical blocks contain the semantic components of person
and number in the more complex pronoun sets as well. These are
blocks of vector formatives, which are equivalent to conventional
morphemes. [13] The remaining verticals, i.e., from columns 1s,
2p, 2s, and 3s of Matrix 9, are broken in one or two places, reflecting
alloformatives, or allomorphs, for person and number.

In describing the distribution of the person and number
formatives, it is convenient to abstract pairs of submatrices for
each pronoun set, separating the person and number formatives.
This segmentation is perhaps of finer detail than that of previous
conventional treatment.

Matrices 10 and 11 are abstracted submatrices for Sets III
and IV, containing the formatives for person and number. Sub-
matrices for these two pronoun sets are used to symbolize the
emic norm of the various matrices of the four sets of pronouns
for the following reasons: (1) Identical categories are found in
each of the matrices. (2) There is a large percentage of identical
formatives throughout the matrices. (3) Person and number
formatives of Sets III and IV are homophonous throughout. (4) The
alloformative variants of the person and number formatives in the
four sets of pronouns are non-contrastive etic variants, conditioned
in one of--or a combination of--the following ways: phonologically
conditioned, or conditioned morphologically by the co-occurrence
of morphemes of aspect or grammatical relationship, or indirectly
conditioned by the distribution of each set within a different tagmemic
slot.

Matrices of alloformatives for person and number in Sets I
and II are not presented since they show only slight etic veriation

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from the norm shown in Matrices 10 and 11. However, in the textual description of the matrices for Sets III and IV, variations of the matrices for Sets I and II will be stated.

2.1.1. Determining Segmentation. The procedure for determining the segmentation of the formatives of these submatrices by examination of the vertical blocks of Matrix 9 is described in detail in the next several paragraphs.

Matrix 10. Emic Formatives for Person.

Person:	1	2	1, 2	3
Number:				
p	-i	-u	ta-	-a
s	a-	w	ta	-a

Matrix 11. Emic Formatives for Number.

Person:	1	2	1, 2	3
Number:				
p	m-	y-	-m	d-
s	-n	y´	m´	n-

Submatrices 10 and 11 have an identical arrangement of categories; the columns contain categories of person (1 speaker; 2 addressee; 1, 2 speaker and addressee; 3 referent), which intersect with categories of number (p plural, s singular) in the rows. Emic formatives for person from Sets III and IV appear in the cells of Matrix 10, with hyphens indicating the position of the number formatives. Matrix 11 contains emic formatives for number from Sets III and IV in the cells, with hyphens indicating the position of the person formatives.

In Matrix 9, columns of person 1, 2 are covered with a ta block in both singular and plural; therefore ta is placed in the 1, 2

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vector of Matrix 10 as person 1, 2 formative. Plural 1, 2 is contrasted with singular by the interior -m block; therefore -m is placed in the cell at the intersection of plural with 1, 2 in Matrix 11 as a plural formative. Singular with person 1, 2 can be analyzed as consisting of either a zero alloformative, or ta without m. The second analysis has been chosen as preferable; it seems awkward to attribute the singular component intersecting with person 1, 2 to zero when, by contrast with 1, 2 plural, the singular component actually seems to be signaled by absence of the plural formative. Pike has adopted the use of an acute accent mark after the formative to indicate its obligatory absence. [14] Using this notation, formative m´ is placed in Matrix 11 as the singular formative which intersects with person 1, 2. The submatrices for Sets I and II (not shown) contain no variants from the formatives seen in Matrices 10 and 11 in these categories.

Second person singular of Set I is enclosed in a zero block in Matrix 9 and can be described as manifested by a zero alloformative for person 2 and singular, or by a different zero for each component. A third alternative may be preferable. The only overt formative which occurs in Set I with 2s is ka, which has been included with the horizontally extensive ka block of Matrix 9. This ka can be analyzed as portmanteau when occurring alone, containing semantic components of person 2 and singular as well as the component for Set I. However, since the ka formative is from a different formative layer, and in order to facilitate this description, the single zero alloformative will be used in this paper to represent both person and number components of 2s in this set.

The person 1 formative of Matrix 9 is abstracted next. Since person formatives in the other cells are vowels and m has already been determined as a plural formative intersecting with person 1, 2, although its position varies in relation to the person formative (i. e. , it occurs before person 1, but after 1, 2 person), the m- formative for plural is placed in Matrix 11 where plural intersects with person 1. Formative -i as person 1 (from the inner layer vertical block of 1p--not to be confused with the horizontal outer layer i block) is placed in the cell at the intersection of person 1 with plural in Matrix 10. There are no variants of formatives for 1p among the four sets of pronouns; mi in vertical block 1p of Matrix 0 is a vector-patterned formative, or morpheme.

Finally, from column 1s of Matrix 9 the 1s formative -an is abstracted. From the right hand column of Matrix 9, 3s, formative n has already been identified as a singular formative intersecting

with person 3. Consistent with the analysis of the other formatives,
the -n of 1s is analyzed as indicating singular here as well. The
vowel is chosen as the person formative, although the order of the
formatives varies here also (compare 1, 2p with 1p above), i. e. , in
3s the order is number formative followed by person formative,
but here in 1s the order is person formative followed by singular
formative. Formative a- as person 1 is placed in Matrix 10 at the
intersection of person 1 with singular. Formative -n as singular
is placed in Matrix 11 at the intersection of singular with person 1.

Sets I and II have alloformative variants of 1s, seen in the
broken vertical block of column 1s in Matrix 9. Set I variant is
-aq, [8] with the vowel formative retained, but -q as an alloformative
of -n for singular. Set II variant is ku, analyzed as k- for singular
and -u for person 1.

2. 1. 2. Listing of Formatives. The alloformatives from all
four sets of pronouns and their meanings, as described in the
preceding paragraphs, are stated as follows, using the notation
adopted by Pike. [16] (U, to be read 'or', represents the union of
two categories; ∩, to be read 'and', represents the intersection of
two categories.) Alloformatives have been listed from Matrix 9 in
order from left to right by columns and from top to bottom by rows.

m	=	plural U singular.
i	=	person 1.
a	=	person 1 U person 3.
n	=	singular.
q	=	singular.
k	=	singular.
u	=	person 1 U person 2.
y	=	plural.
na	=	plural.
w	=	person 2.
#	=	(person 2 U person 3) ∩ singular.
ta	=	person 1, 2.
d~r	=	plural.

2. 1. 3. Listing of Categories. In the above list, ambiguities
are apparent; however, when categories of person and number
intersect, these ambiguities are resolved. The categories are
listed and described below from Matrix 9 in the same order as
stated above. (A hyphen is used with the interesecting formatives
to indicate order of occurrence.)

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person 1 $=$ (i ∩ m-) U (a ∩ [-n U -q]) U (u ∩ k-).

person 2 $=$ (u ∩ [y- U m-]) U (w ∩ [na- U y´]) U (# ∩ka).

person 1, 2 $=$ (ta ∩ [-m U m´]).

person 3 $=$ (a ∩ [d- ~ r- U n-]) U #.

plural $=$ (m ∩ [-i U ta]) U (y ∩ -u) U (na ∩ -w) U

(d ~ r ∩ -a).

singular $=$ (n ∩ [a- U -a]) U (q ∩ a-) U ([k U m]∩-u)

U ([y´ U na´]∩ w) U (# ∩ka) U (m´∩ ta-).

2.1.4. Matrix of Kernel Person and Number Formatives.
As has been mentioned, the above statement includes the alloformatives
for person and number for all four sets of pronouns. The emic
formatives (morphemes) for person and number are displayed in
Matrix 12, which represents the emic kernel[17] of the pronoun
structure and will be symbolized by M_k. At the level of this matrix,
the ambiguities have disappeared. Each cell is filled by a different
formative, a single-cell formative; Matrix 12 is an ideal matrix.[18]

Matrix 12. M_k --Emic Person and Number Formatives.

	Person:	1	2	1, 2	3
M_k =	Number:				
	p	mi	yu	tam	da
	s	an	w	ta	na

The occurrence of the alloformatives for person and number
in each of the pronoun sets has been described above, so that Set II
pronouns can now be defined in the simple emic formula--M_k= Set II.

2.2. Formatives of Aspect and Grammatical Relationships.
The three outer layers of horizontal blocks in Matrix 9 have not

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been defined. The interior one of these is composed of blocks of
ka, t, and g; the middle layer is the block of i which occurs exterior
to ka and t, but interior to g; and the exterior layer contains blocks
n, ku, s, and ag. These outer blocks extend horizontally within the
the rows of Sets IV, III, and I, but not Set II, which suggests a
structural contrast between the first three sets and Set II. Set II
has been defined as consisting simply of kernel pronominal formatives
which are present in all four sets. Complex Sets IV, III, and I are
derived sets.

2.2.1. The i Block. Set II pronouns substitute for substantive
phrases indicating source. Pronouns of Sets IV, III, and I substitute
within a clause for substantive phrases indicating relationships other
than that of source. In Matrix 9, the middle layer formative i block
extends over a large area of these three sets. In Set I, formative i,
which occurs word initially (except before ka, and -aq of ls, which
will be explained later) marks this set as substitutable for a topic
phrase in a clause. Set IV substitutes for a nonemphatic topic phrase
in post-predicate position--but changing it to emphatic topic, or for
an emphatic topic phrase in pre-predicate position. Pronouns of
Set III occur only in oblique relationship within a clause, indicating
that the semantic component of i is modified by the occurrence of
the oblique relationship component.

The analysis of i as carrying the topic relationship component
is interestingly paralleled by the identical shape of a free variant i,
in fast speech, of the phrase marking particle yu, which marks the
topic phrase within a clause.

The i block does not extend over person 1 and person 2 of
Set I or over 3s of Sets III and I. Third singular of Set I has no
overt filler; formative i is assumed to occur here as a zero alloformative.
Third singular of Set III is completely irregular in its outer layer,
which consists solely of ku. This ku block is the only irregularity
in the row of formative n; therefore k is analyzed as an alloformative
of n and u as an alloformative of i.

First person singular of Set I is the only pronoun in the four
sets which has only a bound clitic (suffix) form, i.e., -aq. Since
the semantic component of formative i is present here also, zero
alloformative of i is assumed to occur here; and for the same reason,
the zero alloformative of i is also assumed to occur word initial
before ka in Set I, columns lp, ls, 2p, and 2s. This analysis is
illustrated in Matrix 13. An alternate solution would be to consider

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the <u>ka</u> portmanteau, carrying the topic phrase component as well
as its particular component of aspect which is discussed below.

In formulas for the derivation of the different pronoun
sets, the <u>i</u> formative semantic component will be symbolized by
<u>t</u>, reflecting its topic marking function.

<u>Matrix 13.</u> Abstraction of <u>i</u> Block Showing Alloformatives.

	1p	1s	2p	2s	1,2p	1,2s	3p	3s
IV	<u>i</u>							
III								<u>u</u>
I	<u>#</u>						<u>#</u>	

2.2.2. Blocks of <u>ka</u>, <u>t</u>, and <u>g.</u> Perhaps the most difficult
to define of the horizontal outer blocks of formatives are the blocks
of <u>ka</u>, <u>t</u>, and <u>g</u>. These three blocks divide the columns; <u>ka</u> extends
over person 1 and person 2 of Sets I, III, and IV, except 1s of Set I
where it is assumed that since the semantic component is present,
a zero alloformative of <u>ka</u> occurs; <u>t</u> extends over person 1,2 in these
three sets, and <u>g</u> extends over person 3 in Set IV only. The only
internal clue as to the meaning of these formatives is their contrastive
distribution, which suggests contrast of aspect.

There are other clues as to meaning from the affixation in
the language; <u>ka-</u> is a productive morpheme which occurs prefixed
to stems either alone or in combination with other affixes. The
meaning of <u>ka-</u> varies according to types of stems with which it
occurs; for example, with descriptive stems, i.e., adjectives, it
forms nouns: <u>baddì</u> means 'small', <u>kabaddì</u> means childhood';
<u>awán</u> means 'none', <u>káwán</u> means 'absence'. 'Specific', 'definite',
and 'superlative' are some of the glosses that have been used for
<u>ka-</u>. With reference to the pronouns, the first two of these glosses
may be pertinent to the <u>ka</u> block as a gloss for its aspect meaning
in contrast to the aspect meaning of the formatives <u>t</u> and <u>g</u> described
below.

The two remaining formative blocks of this interior horizontal
layer are blocks of <u>t</u> and <u>g</u>. These are analyzed as alloformatives of

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one formative represented by morphophonemic G on the basis of the following morphological data:

1. In prefixes ending in g, such as mag- and ag-, the g completely assimilates to the initial consonant of the stem, forming a geminate consonant cluster. Single g is retained only with vowel initial stems. For example, pepperán means 'that which is to be fanned', plus ag- becomes appeppek 'the fan', or plus mag- becomes magatà 'to roof'. This morphophonemic change suggests that the pronominal formative t may be an assimilated g.

2. There is a nonproductive affix gi- which occurs with some stems either alone or in combination with other affixes. 'Nonspecific' and 'general' are used as glosses for gi- with certain stems; for example, nuáng means 'carabao', ginuáng means 'domestic four-legged animals'. With some stems -g-, an allomorph of gi-, occurs following ag-, which means 'an instrument'. The contrast of gi- with ka- is seen in the following examples: ammu means 'to know', gigiammuán means 'studying in school', kanammuán means 'comprehension'; ubobuk means 'word', aggubobuk (ag- plus -g-) means 'speech', kobobuk (ka- plus ubobuk) means 'reason for speaking'.

On the basis of the data, the t formative, which occurs before pronoun formative person 1, 2 beginning with initial t, is analyzed as an assimilated -g-, allomorph of gi-, containing the semantic component of 'general', and the g formative of Set IV in 3p and 3s is included in this analysis. The t and g blocks are then brought together into a single G formative block. Metathesis is assumed to have occurred between the g formative and the i formative, which occurs exterior to the blocks of ka and G except in 3p and 3s of Set IV.

However, there are some indeterminacies connected with this analysis. The categories of 3p and 3s is Sets I and III are not included in the G block. Should these two sets be included by postulating a zero alloformative of G? Or is the person 3 category of Sets I and III not included in this formative block because its semantic components of this class will be symbolized by a, reflecting the class meaning of aspect.

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Matrix 14. Abstraction of Blocks of <u>ka</u> and <u>G</u> Showing Zero
Alloformatives.

	1p	1s	2p	2s	1, 2p	1, 2s	3p	3s

IV   <u>ka</u>   <u>G</u>

III   <u>#</u>

I   <u>#</u>
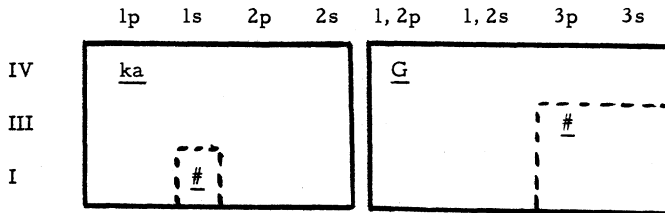
2.2.3. Derivation of Set I. Of the horizontal blocks of
formatives, the occurrence of the interior and middle layers, <u>ka</u>
and <u>G</u> and <u>i</u>, contrasts Set I pronouns with Set II. Since Set II
pronouns have been defined in Matrix 12 as M_k, it is now possible
to derive Set I by matrix multiplication, applying here the procedure
outlined by Pike, [19] i. e., the kernel matrix is assigned a symbol--
M_k; the factors <u>ka</u> and <u>G</u> are symbolized by a (for aspect factor),
and <u>i</u> is symbolized by <u>t</u> (topic phrase); a derived matrix is the
product of multiplication of a kernel matrix. The product of this
multiplication (Formula 1) is a derived single row vector matrix
identical with the third row down abstracted from Matrix 9 (i. e.,
Set I pronouns), which will be labeled M_t since this is the set which
occurs as topic within a clause.

Formula 1. $M_k \cdot a \cdot t = M_t$

2.2.4 Blocks of n and s. Yet remaining to be described
are the exterior horizontal layers extending over Sets III and IV,
which are composed of two mutually exclusive contrastive row vec-
tors. The lower one may be represented by formative <u>n</u>, which
includes the alloformative <u>k</u> intersecting with 3s; the top row
vector may be represented by formative <u>s</u>, which includes the
alloformative <u>ag</u> intersecting with 3p and 3s.

The formatives of these blocks, <u>n</u> ~ <u>k</u> and <u>s</u> ~ <u>ag</u>, carry
the structural signals which contrast Sets III and IV respectively
and indicate their syntactic relationships. Set III pronouns are
substitutable for phrases in oblique relationship within a clause;
the oblique relationship is the grammatical semantic component
of <u>n</u> ~ <u>k</u>. The <u>s</u> ~ <u>ag</u> of Set IV pronouns carries the semantic
component of topic emphasis, and indicates substitutability of

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these pronouns for a topic phrase (Set I pronouns occur here as
nonemphatic topic) or for an emphatic topic phrase, which occurs
in pre-predicate position.

When a name is substituted for a pronoun in a topic phrase
or an emphatic topic phrase (pre-predicate), the name is preceded
by personal marking particle si. But this correlation of shape of
pronoun formative for emphatic topic relationship with the shape
of the personal marking particle indicating the same relationship
is not paralleled in the case of oblique phrases; when a name
substitutes for a pronoun in an oblique phrase position, it is pre-
ceded by the personal marking particle ka.

The personal marking particle ni occurs before names only
in attributive relationship indicating source; only pronouns of Set II
occur here.

2.2.5. Derivation of Sets III and IV. Set III pronouns can
be derived by multiplying the matrix of Set I pronouns, M_t, by the
constant factor n ~ k (oblique relationship), which will be symbolized
by o. The product of this multiplication (Formula 2) is a derived
single row vector matrix identical with the second row down of
Matrix 9 (i. e., Set III pronouns), and this matrix will be labeled
M_o, reflecting its oblique grammatical relationship.

Formula 2. $M_t \cdot o = M_o$

Similarly, Set IV pronouns are derived by multiplication
(Formula 3) of M_t by the constant factor s ~ ag (emphatic topic
relationship), which will be symbolized by e. The resultant
derived single row vector matrix is identical to the first row of
Matrix 9 (i.e., Set IV pronouns), and is given the symbol M_e,
reflecting the emphatic component of the set.

Formula 3. $M_t \cdot e = M_e$

3 Summary. The internal structure of four sets of Atta
pronouns was graphically displayed in the matrices of Section 1.
In Section 2 the semantic components of these pronoun sets were
described and related to the grammatical constructions in which
they occur

Using matrix multiplication, the derivation of the more
complex Sets I, III, and IV from the kernel Set II was reduced

to three simple formulas, reflecting the relationship of the sets to each other, both structurally and semantically.

NOTES

1. Atta is a Negrito dialect of Northern Gagayan Province,
Luson, Philippines. Data were gathered by Whittle and Lusted in
the municipalities of Pamplona, Cagayan Province, and Allacapan,
Cagayan Privince, during the years 1955-63.

2. See Otto Scheerer, "The Nabaloi Dialect," Ethnological
Survey Publications, Manila, 1905, Vol II, Part II, pp. 113-117;
Rufino Alejandro, A Handbook of Tagalog Grammar, Manila, 1947,
Chapter 10; Andrew M. Nelson, A Grammar of the Cebuano Dialect,
Ago Mimeograph Service, Cebu City, Philippines, 1954, Chapter 4;
Morice Vanoverbergh, CICM, Iloko Grammar, Catholic School
Press, Philippines, 1955, Chapter 5; Jose Hevia Campomanes,
O. P. , Grammar of the Tagalog Language, circa 19th century,
p. 16; Howard McKaughan, The Inflection and Syntax of Maranao
Verbs, Manila Bureau of Printing, 1958, p.8.

3. David Thomas, in his "Three Analyses of the Ilocano
Pronoun System," Word, 2:204-208, 1955, breaks down some of the
more complex Ilocano pronouns, and assigns meaning to the
separated morphemes. He states (p. 205, footnote 6), "I have
preferred to analyze these 'free pronouns' as bound pronouns suffixed
to a particle of emphasis, rather than analyzing the total form as
a free pronoun." McKaughan, op. cit. , states, p 8, "Inspection
shows that at least some of these sets consist of combinations of
bound morphemes with perhaps allomorphs of pronominal basis...
morphemes could be isolated in Sets I and II with an attempt to
relate such morphemes to grammatical or lexical meanings. However,
for ease of description and reference, we have listed the members
of the paradigms as units without further analysis." Phyllis Healy
in her An Agta Grammar, Manila Bureau of Printing, 1960, p. 16,
states "...it is impossible and unprofitable grammatically to try to
draw morphological boundaries within the forms of these pronouns..."
Agta is a language closely related to Atta.

4. Kenneth L. Pike, Matrix Permutation and Conflation,
presented under the title Matrix Rotation and Matrix as an Emic
Unit, to the annual meeting of the Linguistic Society of America in

New York, Dec. 29, 1962. He defines permutation as "any inter-
change of rows, or interchange of columns, or interchange of rows
with columns, or interchange of cell components from inside to
outside the matrix." (p. 2) Conflation is "the result of super-
imposition--of the blocks of formatives of the various submatrices."
(p. 7).

5. As defined by Pike, op. cit., "A formative...is the
phonological particle filling a cell of an emic matrix."

6. When Sets I and II occur in juxtaposition in the syntax
some fusion occurs, forming a pseudo-Set V.

7. Leonard Bloomfield, in Language, 1933, terms plural
pronouns like these in Tagalog respectively "exclusive first person
plural" and "inclusive first person plural." Healy, op. cit., p. 15,
terms person 1, 2 the inclusive person. For a handling of pronominal
semantic components in Hanunóo, see Harold C. Conklin, "Lexico-
graphical Treatment of Folk Taxonomies." IJAL, 28:2, Part IV,
April, 1962, pp. 119-137. He presents in a cube diagram the "regular
intersection of six components which comprise three simple
oppositions." See Thomas, op. cit., for a comparison of three
analyses of Ilocano pronouns, the third of which he recommends as
adequate for Ilocano.

8. The following allomorphs occur: In Set I, 1s, aq ~ ngaq;
aq occurs following consonants; ngaq occurs following vowels. In
Set II, 1s, ku ~q; ku occurs following consonants; q occurs following
vowels. In Set II, 2s, mu ~m; mu occurs following consonants; m
occurs following vowels.

9. These matrices do not include all the intermediary
experimental permutations that were made. Only those are shown
from which significant patterning developed.

10. These implications were discussed in Section 2.

11. Pike, op. cit., states, p. 21, "the single-celled
formative may be called an ideal particle..."

12. Pike, "Language as Particle, Wave, and Field," The
Texas Quarterly, Vol. II, No. 2, Summer, 1959, p. 38. "The view
of language as made up of field sees language as functional, as a

system with parts and classes of parts so interrelated that no
parts occur apart from their function in the total whole, which in
turn occurs only as the product of these parts in functional relation
to a meaningful social environment. "

13. Pike, Matrix Permutation and Conflation, "The conven-
tional simple morpheme of an inflectional type is isomorphic with a
formative which fills every cell of one row of a matrix, or of one
column of a matrix (but not both)... If we call either the full row or
a full column a vector pattern in the matrix, then the simple inflection-
al morpheme is a vector-patterned formative. "

14. Pike, op. cit. , Section I, C. , (7b) and (8).

15. The distribution of these two formatives can be phono-
logically defined: -u occurs following a consonant; -w occurs following
a vowel. This should not be interpreted to mean that there are no
vowel clusters in the language.

16. Pike, loc. cit.

17. Pike, "Dimensions of Grammatical Constructions,"
Language,   38:221-44, 1962.

18. Matrix Permutation and Conflation.

19. "Dimensions of Grammatical Constructions, " p. 226.

LINKED CITATIONS

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Notes

[17] **Dimensions of Grammatical Constructions**
Kenneth L. Pike
Language, Vol. 38, No. 3, Part 1. (Jul. - Sep., 1962), pp. 221-244.
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