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AUTHOR          Pye, Clifton
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ABSTRACT
                The speech of three Quiche Mayan children aged 2:1,
2:9, and 3:0 was monitored for the acquisition of the distinction
between ergative and absolutive person markers. The children were
found not to confuse markers, but to use either the appropriate one
or none at all. The one exception to this rule, when analyzed,
indicates that children grasp the distinction between person markers
before they produce them in their own speech. Order of acquisition
did not follow semantic predictability, nor did frequency order of
person markers in adult speech consistently correlate with order of
acquisition. Instead, perceptual saliency, as determined by
interaction between forms of person markers and rules determining
word stress and syllable boundaries, correlated significantly with
acquisition order. These findings support a model of language
acquisition in which children first produce those parts of utterances
that have the greatest degree of perceptual saliency (i.e., that
require the least auditory processing), and then move on to the next
degree. (JB)

# The Acquisition of Person Markers in Quiché Mayan

Clifton Pye
University of Pittsburgh

It has long been the fashion to seek the determinants of lan-
guage acquisition in syntactic and semantic complexity. The pre-
sent study suggests that perceptual saliency, defined in terms of
segmentability and stress, may play an important role in language
acquisition. The material in this study comes from longitudinal
records of three Quiché Mayan children, ages 2;1, 2;9 and 3;0 when
I began, and living in the Indian town of Zunil in the western
highlands of Guatemala. I visited the children in their homes over
a period of nine months, approximately once every two weeks for a
one-hour play session, at which I made a recording of their speech.
Quiché was the predominant language in all three households al-
though some of the parents could speak Spanish. The children only
spoke Quiché during the play sessions, this being the language that
I used with them.

Quiché is an ergative language; one set of person markers (erga-
tive) marks the subject of transitive verbs, the possessor in geni-
tive constructions, and the object of relational nouns (which are
similar to prepositions in English). Another set (absolutive)
marks the subject of intransitive verbs and the direct object

of transitive verbs. The person markers are obligatory in
these environments and are bound to the word they mark. In Mayan
studies, the ergative set of person markers is traditionally re-
ferred to as set A while the absolutive set is referred to as set B.
Each set has six person markers: three persons in singular and plu-
ral. Each of the person markers in set A (the ergative set) has
two allomorphs, one before vowel (or glottal stop)-initial stems
and one before consonant-initial stems. The sets of person markers
on verbs are given below:

| Person | Set $A_V$ | Set $A_C$ | Set B |
|--------|-----------|-----------|-------|
| 1 | inw- | in- | in- |
| 2 | aw- | a- | at- |
| 3 | r- | u- | ∅ |
| 4 | q- | qa- | uj- |
| 5 | iw- | i- | ix- |
| 6 | k- | ki- | e- |

The person markers on genitives and relational nouns substitute /w-/
for $A_V$1 /inw-/ and /nu-/ for $A_C$1 /in-/. Otherwise they are exactly
the same as the person markers on verbs. Some examples of the use
of person markers in adult Quiché speech are shown in (1):

(1)  x-in-pee   r- uuk' lee in-  taat      x-in- u- tii  lee tz'i7
     asp-B1-come A$_V$3-with the A$_C$1-father  asp-B1-A$_C$3-bite the  dog
          I came with my father.          The dog bit me.

In early samples, the children typically uttered only one or
two syllables of a word, usually the stem or the stem plus a suf-
fix.  The person markers, by and large, were missing.  The intended
referents of the children's utterances were clear from the linguis-
tic and nonlinguistic contexts approximately 95% of the time (a be-
nefit of discussing the here and now with children).  The conversa-
tion shown in (2) is typical of this period:

(2)          Mother: lee katijoh katcha7. 'You eat them say.'
   Al Chaay (2;9) : toh. (c.f.  lee    k-Ø- a- tij- oh  )
                          those asp-B3-A$_C$2-eat-status
             M: jawii kaloq' wii liwaa katijoh katcha chareh
                'Where do you buy the food you eat, say to him.'
         Al Chaay: loq' wih waa?
                   (c.f. jawii   k-Ø- a-loq' lee i- waa )
                   Where asp-B3-A$_C$2-buy the A$_C$5-food

With one exception, there was no confusion between the various per-
son markers in the children's speech; they either used the appro-
priate marker or none at all.  This contrasts with previous findings
in such fusional languages as Portuguese (Simões and Stoel-Gammon
1979), Estonian (Lipp 1977), and Latvian (Rūķe-Draviņa 1973) where a
single inflection encodes both person and tense, and where the
third person singular of the indicative was the initial form the
children used for every person.  The exception in Quiché occurred in
the children's use of the preconsonantal allomorph of the first per-
son singular in possessive environments.  This possessive marker is
unusual in that it has two forms: one form /nu-/ is used to form the
possessive in the vast majority of words while the second form /in-/
is used with only two words in my corpus, tat 'father' and chaq'
'younger sibling'.  The children produced utterances with nu-taat as
compared with the adult form of in-taat 'my father'.  This exception
is easily explainable in terms of Slobin's (1973) principle of
avoiding exceptions.  What is surprising about the Quiché data is
that the children did not apply this operating principle more thor-
oughly.  For example, if the same semantic notion of agent underlay
the subject of both transitive and intransitive verbs, one would ex-
pect the children to overgeneralize the set of ergative person mar-
kers and apply them to intransitive verbs, or one might expect the
children to use preconsonantal forms of the ergative with words be-
ginning with vowels.  The fact that such overgeneralizations did not
occur, despite the extremely high frequency of obligatory environ-
ments for person markers in the children's speech, implies that the
children had already sorted out the different person markers in
terms of their meaning before they began producing the person mark-
ers in their own speech.

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The person markers showed extreme changes in their presence
from sample to sample. This makes it difficult to apply Brown's
(1973) and Cazden's (1968) criterion for acquisition of three suc-
cessive samples of a ninety percent presence or greater. In order
to reduce the variation between samples, I used only samples with
five or more obligatory contexts as a basis for computing the mor-
phemes' percentage presences. I then ranked the person markers in
acquisition orders for all three children using the sample number
for the morphemes acquired during the study and the final percent-
age for the morphemes not acquired. I used the Spearman rho (cor-
rected for ties) to compare the person marker acquisition orders
and found a significant correlation between the orders of person
marker acquisition on verbs (rhos=.59, .68, .70; p=.05). The re-
sults for person markers on possessives and relational nouns were
not significant, but this may have been due to the lack of data in
these two environments. I obtained continuous data for eleven of
the person markers on verbs, but only eight of the person markers on
possessives, and five of the person markers on relational nouns.
Combining the data for all three environments, I found a correlation
at the .05 level of significance. This is an astonishing result
given the nature of the morphemes being compared and the variation
in the morphemes' presences from sample to sample. All of the per-
son markers are instances of just the single morphological category
of person marked on different words. The distinctions of case,
person and number are much finer than the comparatively gross seman-
tic and syntactic distinctions among the other grammatical morphemes
for which invariant acquisitional orders have been demonstrated
(Brown 1973, Lipp 1977).

I tested several possible determinants of the person marker
acquisition orders separately for person markers on verbs, posses-
sives and relational nouns. Syntactic complexity cannot be a major
determinant of person marker acquisition in any of the three envi-
ronments since the person markers are all introduced by the same
agreement rules. Semantic complexity also seems to have little to
do with person marker acquisition. If semantics was a determining
factor, I would have expected the person markers with the same mean-
ing (especially the prevocalic and preconsonantal allomorphs of the
ergative set) to have been acquired at approximately the same times.
In fact I tested such a set of semantic predictions in all three
environments and found no significant correlation between the seman-
tic predictions and the children's acquisition orders. The fact
that the acquisition order of the person markers on verbs in Quiché
was different from the acquisition orders reported for Portuguese
(Simões and Stoel-Gammon 1979), Estonian (Lipp 1977), and Latvian
(Rūke-Dravina 1973) would also seem to rule out semantics as a major
determinant of person marker acquisition.

Another possibility is that the frequency with which the differ-
ent person markers are modeled in adult speech determines their or-
der of acquisition. One would expect children first to learn the
person markers that they heard most often in the speech around them.
To test this possibility, I first determined the frequencies of the

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person markers in the speech of the children's mothers. The person markers were all present in over 90% of the obligatory environments in the mothers' speech. There was a significant correlation between the frequency rank-orders of the person markers on verbs in the mothers' speech. Once again, there may have been too few person markers in the other environments to be able to measure a correlation in person marker usage in the mothers' speech. When I tested the frequency order of the person markers on verbs in the mothers' speech and the children's acquisition orders, I found a negative correlation (Spearman rho = -.209). I also examined the possibility that frequency was responsible for the variation between the children's acquisition orders by comparing the differences among the children's acquisition orders with the differences in the frequency rank-orders among the mothers. I found no indication in any of the three environments that frequency might account for the variation among the children's acquisition orders. This outcome is similar to one Brown (1973) found for American children learning English. I would agree with Brown that frequency does not play a significant role in children's acquisition of grammatical morphemes.

Frequency is just one factor related to the perceptual saliency of grammatical morphemes. While relatively little work has been done on the relation of speech perception to language acquisition (c.f. Eimas 1974), there is reason to suspect that three factors: phonetic substance, stress, and phrase-final position, make grammatical morphemes more salient perceptually for young children (Blasdell and Jensen 1970). The person markers in Quiché interact in subtle ways with the rules determining word stress and syllable boundaries, producing real differences in the morphemes' perceptual saliency. I give some examples of this interaction in (3) (a slash marks a syllable boundary and an apostrophe marks the syllable receiving the main word stress):

(3) ka-∅-/ r- íil leé  w-e/tz'a/b'a71    x-∅- qa-/tíij qa-/ri/kí71
   asp-B3-A$_V$3-see the A$_V$1    toy    asp-B3-A$_C$4- eat A$_C$4- food
       She sees my toy.    We ate our food.

  ka-∅- u-/q'a/lúuj leé  r- áal    x-∅- in-/k'aam  w- uuk'
  asp-B3-A$_C$3- hold  the A$_V$3-baby    asp-B3-A$_C$1-bring A$_V$1-with
       She holds her baby.    I brought it with me.

In their early samples, the children produced forms that followed a segmentation according to syllable boundary rather than the actual boundary between morphemes. One of the children, for example, produced the utterances shown in (4):

(4) A Carlos (3;0): wilóh. (c.f. k-∅-a/w-ii/loh, asp-B3-A$_V$2-see-stat)
          telóq. (c.f. ch-a/t-ee/1-óq, vol.-B2-leave-stat)

The utterance wiloh contains only the second part of the person marker A$_V$2 /aw-/ while the utterance teloq contains only the latter part of the person marker B2 /at-/. I found a general tendency

among all of the children in the early stages to reduce words to the
single stressed syllable. This has a striking effect in Quiché
since the language has an extremely regular system of word stress--
stress always falls on the final syllable of the word.

The interaction between the forms of the person markers and the
rules determining word stress and syllable boundaries might be
responsible for the children's acquisition orders. A person marker
that is entirely part of a stressed syllable should be easier to
hear than a person marker that forms only an unstressed syllable
which, in turn, should be more salient than a person marker that is
occasionally split by the syllable boundary or one that is always
split by the syllable boundary. On this basis, the person markers
can be ordered according to their perceptual saliency as in (5):

(5)                     Verbs                    Possessives and Rel. Nouns
    Most salient: $A_V3$, $A_V4$                    $A_V1$, $A_V3$, $A_V4$
    Intermediate: $A_C1$, $A_C2$, $A_C3$, $A_C4$    $A_C1$, $A_C2$, $A_C3$, $A_C4$
                  B1, B2, B4
    Least salient: $A_V1$, $A_V2$                   $A_V2$

(Perceptual saliency makes slightly different predictions for person
markers on possessives and relational nouns since the forms of the
person markers in these two environments are slightly different from
the forms of the person markers on verbs.) I found a significant
correlation (rho = .59, p = .05 for person markers on verbs) between
the children's acquisition orders and the predictions from percep-
tual saliency in all three environments. Moreover, perceptual sali-
ency would predict that person markers would be acquired in the
order: 1. relational nouns, 2. possessives, 3. verbs, since rela-
tional nouns tend to be one or two syllable words appearing in
utterance-final position, verbs are usually polysyllabic and appear
at the beginning of utterances, while possessives fall inbetween
verbs and relational nouns in terms of their average number of
syllables and utterance position. That this is what actually
occurred may be seen in (6), which shows how one child acquired the

(6)



PERCENT MORPHEMES IN OBLIGATORY CONTEXTS

SAMPLE NUMBER

_____ RELATIONAL NOUNS
___ ___ POSSESSIVES
_ _ _ VERBS
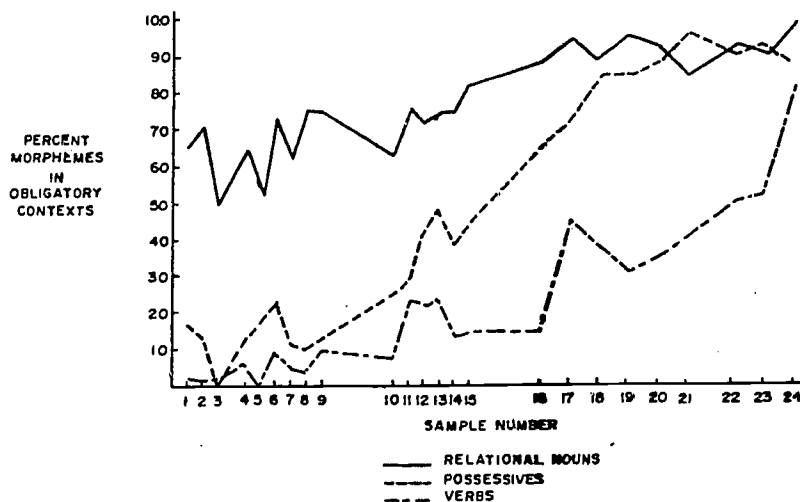
ergative markers on verbs, possessives and relational nouns.

Perceptual saliency then, defined in terms of susceptibility to word and sentence stress and lack of disjuncture caused by a syllable boundary, was significantly related to the children's acquisition of person markers in three different environments. This has some interesting implications for research on language acquisition. The most widely accepted approach to speech perception proposed so far is some kind of analysis by synthesis model (Stevens 1960). Hearers are said to generate their own models of what was said and then match these against the sounds retained in their acoustic memory. Such a theory accounts for the facts that hearers can follow what is being said in noisy environments or actually supply parts of sentences that were experimentally cut. Such hearers, however, have internalized an adult grammar of the language which enables them to generate models of what is being said. Hearers who are linguistically naïve have no such grammar with which to generate their models of what is being said. The analysis by synthesis model of speech perception would predict that young children find it more difficult than adults to perceive speech. If such is the case, one might expect children to first direct their attention to the more perceptually salient parts of utterances that require a minimum of auditory processing, and to use these "bright" parts of utterances as anchors for their perception and analysis of utterances. When the perception of such bright spots had become fairly well established and a matter of routine, children would move on to the next brightest parts of utterances and begin analyzing them.

My own findings indicate that children follow such a pattern in their production of speech, i.e. they first produce those parts of utterances with the greatest degree of perceptual saliency and then move on to the parts with the next degree of perceptual saliency. One might predict that in environments where semantic understanding preceded production, there would be few errors in grammatical morpheme usage, even though the morphemes were being supplied in a small percentage of their obligatory environments. The person markers in Quiché and the progressive marker in English (Brown 1973) are relevant examples. Where semantic understanding lags behind the production of a particular morpheme, one could expect the morpheme to be overgeneralized to inappropriate environments as was the case with the Quiché possessive allomorphs /nu-/ and /in-/ and the past tense of irregular verbs in English. However, the time at which a particular linguistic feature appears in children's speech is first of all dependent upon the perceptual saliency of the feature and not semantic or syntactic complexity. It may not be an accident after all that the prominent phonological features of human languages also encode major semantic roles.

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