The Acquisition of Word Order and Its Constraints in Kaqchikel: A Preliminary Study

Koji Sugisaki, Koichi Otaki, Noriaki Yusa, and Masatoshi Koizumi

1. Introduction

The acquisition of word order has been one of the central issues in the study of child language, and a matter of considerable interest with regard to this issue has been an example of languages characterized by relatively free ordering of constituents. These languages raised the question of whether children have access to all the permitted orders from the earliest observable stages, and also the question of whether children are sensitive to the constraints on the use of various orders. For example, in the acquisition of Japanese, a free word-order language that allows both the SOV order as in (1a) and the scrambled OSV order as in (1b), it has been observed at least since Hayashibe (1975) that even five-year-old Japanese-speaking children tend to misinterpret OSV sentences, by taking the first NP as the Agent of the action denoted by the verb, and the second NP as the Theme.

(1)  a. SOV: Kamesan-ga ahirusan-o osimashita. turtle-NOM duck-ACC pushed
    b. OSV: Ahirusan-o kamesan-ga osimashita. duck-ACC turtle-NOM pushed
    ‘A/The turtle pushed a/the duck.’

However, a later study by Otsu (1994) demonstrated that the purported difficulty children have when comprehending scrambled sentences is an experimental artifact. Building on the observation by Masunaga (1983), Otsu pointed out that the scrambled NP must have been established as a discourse topic in order to make the use of scrambled sentences natural. Otsu’s experiment took this constraint into consideration, and presented OSV sentences with another sentence that was designed to establish the scrambled object of the test sentence as the discourse topic. When presented with such a lead-in sentence, children around the age of three showed virtually no difficulty in interpreting OSV sentences.

(2)  Lead-in: Kooen-ni ahirusan-ga imashita. park-in duck-NOM was
    OSV: Sono ahirusan-o kamesan-ga osimashita. the duck-ACC turtle-NOM pushed
    ‘There was a duck in a park. A turtle pushed the duck.’

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These findings from the acquisition of Japanese not only suggest that three-year-olds already have knowledge of word-order variations, but also that they are highly sensitive to the subtle discourse constraints on the use of the scrambled order.

In light of this background, this study attempts to address the question of whether the early acquisition of word-order constraints can be observed in the acquisition of Kaqchikel, a Mayan language that is argued to have the basic order of VOS but still exhibits flexible word order. The results of our experiment, even though quite preliminary, suggest that Kaqchikel-speaking four-year-olds are subject to the constraints imposed on the V-initial sentences.

2. Verb-initial Sentences and their Constraints in Kaqchikel

Kaqchikel is one of the 22 Mayan languages spoken in Guatemala. It is mainly used in the highland west of Guatemala City, the capital. Kaqchikel has approximately 450,000 speakers, and is one of the principal Mayan languages along with K'iche', Q'eqchi', and Mam (Lewis 2009).

Like other languages in the Mayan family, Kaqchikel is a head-marking language: There is no overt case-marking on subjects or objects, and person and number agreement for both of these NPs is expressed on the verb (Kaufman 1990). Again, along with other Mayan languages, Kaqchikel verb agreement works on an ergative-absolutive basis. The following sentences illustrate these properties (“ø” indicates a phonologically empty exponent).1

(3) TRANSITIVE (Preminger 2011:26):

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td></td>
<td>rat</td>
<td>x-ø-aw-axa-j</td>
<td>ri achin</td>
</tr>
<tr>
<td></td>
<td>you(sg.)</td>
<td>PRFV-3sg.ABS-2sg.ERG-hear-ACT</td>
<td>the man.</td>
</tr>
<tr>
<td>a.</td>
<td>‘You(sg.) heard the man.’</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ri achin</td>
<td>x-a-r-axa-j</td>
<td>rat</td>
</tr>
<tr>
<td></td>
<td>the man</td>
<td>PRFV-2sg.ABS-3sg.ERG-hear-ACT</td>
<td>you(sg.)</td>
</tr>
<tr>
<td>b.</td>
<td>‘The man heard you (sg.).’</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(4) INTRANSITIVE (Preminger 2011:26):

<p>| | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>ri achin</td>
<td>x-ø-uk’lun</td>
<td></td>
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<tr>
<td></td>
<td>the man</td>
<td>PRFV-3sg.ABS-arrive</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>‘The man arrived.’</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>rat</td>
<td>x-at-uk’lun</td>
<td></td>
</tr>
<tr>
<td></td>
<td>you(sg.)</td>
<td>PRFV-2sg.ABS-arrive</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>‘You (sg.) arrived.’</td>
<td></td>
<td></td>
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</tbody>
</table>

As shown in (3) and (4), the single argument of the unaccusative receives the same marking as the object of the transitive: ø (empty) for 3sg arguments, “-a(t)-” for 2sg ones. In contrast, the subject of the transitive receives a different marking: “-r(u)/u-” for 3sg arguments, “-a(w)-” for 2sg ones.

Kaqchikel has the property of flexible word order, and permits (at least) VOS, VSO, and SVO orders, as exemplified in (5).

(5) a. VOS/VSO:

<p>| | | | |</p>
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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>X-ø-u-b’a’</td>
<td>ri tz’i’</td>
<td>ri me’s</td>
<td></td>
</tr>
<tr>
<td>PRFV-3sg.ABS-3sg.ERG-bite</td>
<td>the dog</td>
<td>the cat</td>
<td></td>
</tr>
<tr>
<td>‘The cat bit the dog.’ (VOS) / ‘The dog bit the cat.’ (VSO)</td>
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</table>

b. SVO:

<p>| | | | |</p>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ri tz’i’</td>
<td>x-ø-u-b’a’</td>
<td>ri me’s</td>
<td></td>
</tr>
<tr>
<td>the dog</td>
<td>PRFV-3sg.ABS-3sg.ERG-bite</td>
<td>the cat</td>
<td></td>
</tr>
<tr>
<td>‘The dog bit the cat.’</td>
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</tbody>
</table>

1. Abbreviations used in the glosses are: NOM (= Nominative), ACC (= Accusative), ABS (= Absolutive), ERG (= Ergative), sg (= Singular), pl (= Plural), PRFV (= Perfective), IMPF (= Imperfective), ACT (= Active), DIR (= Directional).
According to Broadwell (2000) and Broadwell & Smith (2001), the verb-initial sentences in Kaqchikel as in (5a) exhibit certain ordering principles for the postverbal NPs. If a transitive verb is followed by two NPs with equal degrees of definiteness, then both VOS and VSO orders are grammatical and hence the relevant sentences are ambiguous.

\[
(6) \quad \text{X-ø-r-oqotaj} \quad \text{ri me’s} \quad \text{ri tz’i’}
\]
\[
\text{PRFV-3sg.ABS-3sg.ERG-chase} \quad \text{the cat} \quad \text{the dog}
\]
\[
\text{‘The dog chased the cat.’ (VOS) / ‘The cat chased the dog.’ (VSO)} \quad \text{(Broadwell 2000)}
\]

However, if one of these NPs is definite and the other is indefinite, then these two NPs must obey the ordering constraints stated in (7). The effects of these constraints are illustrated in (8) and (9).

\[
(7) \quad \text{Ordering Constraints on V-initial Sentences in Kaqchikel (Broadwell 2000):}
\]
\[
a. \quad \text{The definite NP must follow the indefinite NP. (A strong preference)}
\]
\[
b. \quad \text{The definite NP is interpreted as the subject. (An inviolable rule)}
\]

\[
(8) \quad \text{X-ø-r-oqotaj} \quad \text{jun me’s} \quad \text{ri tz’i’}
\]
\[
\text{PRFV-3sg.ABS-3sg.ERG-chase} \quad \text{a cat} \quad \text{the dog}
\]
\[
\text{‘The dog chased a cat.’ (VOS) / ‘A cat chased the dog.’ (VSO)} \quad \text{(Broadwell 2000)}
\]

\[
(9) \quad \text{?* X-ø-r-oqotaj} \quad \text{ri tz’i’} \quad \text{jun me’s}
\]
\[
\text{PRFV-3sg.ABS-3sg.ERG-chase} \quad \text{the dog} \quad \text{a cat}
\]
\[
\text{(Broadwell 2000)}
\]

The ordering constraints in (7) give rise to the situation in which only the VOS order is possible, as shown in (8): When one of the postverbal NPs is indefinite, the indefinite NP must precede the definite NP due to the constraint in (7a), and since the definite NP must be interpreted as the subject due to the restriction in (7b), the preceding indefinite NP necessarily constitutes the object of the sentence. Then, since the VOS sentences are in effect permitted in more environments than the VSO sentences as shown in (8), we can reasonably assume that the VOS order is more basic than the VSO order.\(^2\)

The ordering constraints on Kaqchikel V-initial sentences in (7) lead to the question of whether Kaqchikel-speaking children have knowledge of these restrictions and hence exclude VSO interpretations from sentences like (8). The experiment reported in the next section is a very first attempt to answer this question.

### 3. Verb-initial Sentences and their Constraints in Child Kaqchikel

#### 3.1. Research Question to be Addressed

The question we address in our preliminary experiment is as follows:

\[
(10) \quad \text{Question:}
\]
\[
\text{Do Kaqchikel-speaking children have knowledge of the definiteness restrictions on V-initial sentences?}
\]

If the knowledge of the definiteness restrictions in (7) is included in the grammar of Kaqchikel-speaking children, they will disallow the VSO interpretation for sentences like (8), while permitting the corresponding interpretation for sentences like (6), in which both of the postverbal NPs are definite. Then, if we can show that Kaqchikel-speaking children are sensitive to the interpretive contrast between (6) and (8) with respect to the availability of the VSO interpretation, this would suggest that these children know that the VOS sentences are permitted in wider environments than the VSO sentences, and hence that the former is more basic than the latter.

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\(^2\) Koizumi et al. (under review) provides evidence from a sentence-processing experiment that VOS is the basic order of Kaqchikel. Using a sentence plausibility judgment task, Koizumi et al. investigated the processing load of Kaqchikel sentences with three different orders (VOS, VSO, and SVO). The results obtained from 22 native speakers of Kaqchikel revealed that VOS was processed significantly faster than VSO and SVO.
3.2. Subjects and Method

The subjects of our preliminary experiment were 10 children acquiring Kaqchikel as their native language, ranging in age from 3;09 to 5;05 (mean age 4;07). They were tested individually by an adult native speaker of Kaqchikel.

The task for children was a simplified version of the truth-value judgment task (Crain & Thornton 1998). In this task, a puppet told a child brief stories, each of which consisted of two sentences (a lead-in sentence and a test sentence) and was accompanied by two pictures presented on a laptop computer. The task for the child was to judge whether the puppet’s description of the pictures was correct or wrong, by pointing at one of the cards the puppet had in her hands: a strawberry (which means ‘correct’) or a hot pepper (which means ‘wrong’). Sample trials are given in (11) and in (12).

For example, in the case of (11), an experimenter told a child a brief story, in which a kangaroo and a tiger were standing near a pond (the lead-in part), and then the kangaroo bit the tiger (the test-sentence part). Since both of the animals (a kangaroo and a tiger) were introduced in the lead-in sentence, they should be referred to by using definite NPs in the test sentence. The test sentence in (11) has the V-initial order with two definite NPs and hence is ambiguous between the VOS interpretation and the VSO interpretation. If children have the knowledge of the definiteness restrictions in (7), they should allow the subject NP (‘the kangaroo’) to precede the object NP (‘the tiger’) and thus should judge the test sentence to be true in this situation.

(11) Pictures: 1. A kangaroo and a tiger are standing near a pond.
               2. The kangaroo is biting the tiger.

Lead-in Sentence: E-k’o         jun  kanguro  chuqa’  jun  b’alam  chuchi’
                  3pl.ABS-there.are a kangaroo  and  a  tiger side
                  ri  k’ojlib’äl ya’.  the pond
                  ‘There are a kangaroo and a tiger near a pond.’

Test Sentence: N-ø-u-k’apij  ri  kanguro  ri  b’alam.
               IMPF-3sg.ABS-3sg.ERG-bite the kangaroo  the tiger
               (\text{OK} VSO, Expected Answer: TRUE)

In contrast, in the case of (12), only one of the two animals was introduced in the lead-in sentence: In this story, a hippo was standing near the pond (the lead-in part), and a lion bit the hippo (the test-sentence part). Then, only the animal that was already mentioned in the lead-in part (in this case, a hippo) can naturally be expressed with a definite NP in the test sentence. Since one of the two NPs is definite while the other is indefinite, the constraint in (7a) imposes a certain order on V-initial sentences, namely the order in which the definite NP follows the indefinite NP. However, the constraint in (7b) forces the definite NP to be interpreted as the subject of the V-initial sentence, which leads to the unambiguous VOS interpretation. Since the action depicted in the picture only matches that of the VSO interpretation, children with the knowledge of the constraints in (7) should judge the test sentence to be false in this situation.
The experiment consisted of two practice items, two trials with a sentence in which both NPs were definite (as in (11)), and two trials with a sentence in which one of the NPs was indefinite (as in (12)). The list of the test sentences is given in the appendix.

3.3. Results and Discussion

The overall results are summarized in Table 1.

<table>
<thead>
<tr>
<th>Word Order</th>
<th>V - NP_{def} - NP_{def}</th>
<th>V - NP_{indef} - NP_{def}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigned Interpretation</td>
<td>VSO</td>
<td>VOS</td>
</tr>
<tr>
<td>Number of Responses</td>
<td>19/20</td>
<td>1/20</td>
</tr>
<tr>
<td>% of Responses</td>
<td>95%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Table 1: Summary of the Results

Even though the results are still preliminary, we found a contrast between children’s responses to the V-initial sentences with two definite NPs and their responses to those involving an indefinite NP. When children were presented with the V-initial sentences with two definite NPs, along with the context in which only the VSO interpretation was true, they accepted those sentences 95% of the time. In contrast, when children were presented with the V-initial sentences in which the verb was followed by two NPs involving the indefinite NP – definite NP order, along with the context in which only the VSO interpretation was true, they accepted those sentences only 55% of the time. The latter results in turn suggest that children interpreted the V-NP_{indef}-NP_{def} sentences as having the VOS order 45% of the time. These results, even though far from conclusive at this point, suggest that children are sensitive to the definiteness restrictions in (7) which together forces the V-NP_{indef}-NP_{def} sentences to have the VOS interpretation.

4. Conclusion

Even though the results are quite preliminary in that the number of children and test items are very small, it is encouraging to see the finding that Kaqchikel-speaking children appear to have knowledge of the constraints on V-initial sentences given in (7), which give rise to the situation in which only the VOS order is permitted. This finding suggests that Kaqchikel-speaking children know that the VOS
order is permitted in wider environments than the VSO order, and hence that the former is more basic than the latter. While a far more comprehensive study is available for the acquisition of K’iche’ (Pye 1991), few studies have so far looked at the acquisition of Kaqchikel. We hope that our future research of this topic provides an important step toward understanding children’s acquisition of Kaqchikel, thereby contributing to understanding the nature of children’s acquisition of Mayan languages.

**Appendix 1: List of Test Sentences**

[1] **Practice Trials:**

(A) **Lead-in Sentence:** E-k’o jun kanguro chuqa’ jun b’alam pak’ichelaj
3pl.ABS-there.were a kangaroo and a tiger in forest
‘There were a kangaroo and a tiger in a forest.’

**Test Sentence:** Ri kanguro x-ø-tzok’in-el pa ruwi’ ri ch’ich’
the kangaroo PRFV-3sg.ABS-jump-DIR on top.of the fence
‘The kangaroo jumped over the fence.’

(B) **Lead-in Sentence:** E-k’o jun hipopotamo chuqa’ jun le’on
3pl.ABS-there.are a hippo and a lion
chuchi’ ri k’ojlib’äl ya’
near the pond
‘There are a hippo and a lion near the pond.’

**Test Sentence:** Ri le’on n-ø-atín pa ri k’ojlib’äl ya
the lion IMPF-3sg.ABS-bathe in the pond
‘The lion is swimming in the pond.’

[2] **Test Trials:**

(C) **Lead-in Sentence:** Jun aq chuqa’ jun sebra e-k’o pa k’ichelaj
a pig and a zebra 3pl.ABS-there.are in forest
‘There are a pig and a zebra in the forest.’

**Test Sentence:** N-ø-r-oqotaj ri aq ri sebra.
IMPF-3sg.ABS-3sg.ABS-chase the pig the zebra
‘The pig is chasing the zebra.’ (VSO) / ‘The zebra is chasing the pig.’ (VOS)

(D) **Lead-in Sentence:** E-k’o jun kanguro chuqa’ jun b’alam chuchi’
3pl.ABS-there.are a kangaroo and a tiger side
ri k’ojlib’äl ya’.
the pond
‘There are a kangaroo and a tiger near a pond.’

**Test Sentence:** N-ø-u-k’apij ri kanguro ri b’alam
IMPF-3sg.ABS-3sg.ABS-bite the kangaroo the tiger
‘The kangaroo is biting the tiger.’ (VSO) / ‘The tiger is biting the kangaroo.’ (VOS)

(E) **Lead-in Sentence:** Jun wakx ø-k’o pa k’ichelaj
a cow 3sg.ABS-there.is in forest.
‘There is a cow in a forest.’

**Test Sentence:** N-ø-u-k’apij jun karnel ri wakx
IMPF-3sg.ABS-3sg.ABS-bite a sheep the cow
‘The cow is chasing a sheep.’ (VOS)

(F) **Lead-in Sentence:** ø-k’o jun hipopotamo chuchi’ ri k’ojlib’äl ya’
3sg.ABS-there.is a hippo side the pond
‘There was a hippo near the pond.’

**Test Sentence:** N-ø-u-k’apij jun le’on ri hipopótamo.
IMPF-3sg.ABS-3sg.ABS-bite a lion the hippo
‘The hippo is biting a lion.’ (VOS)
Appendix 2: Individual Responses

<table>
<thead>
<tr>
<th>Age</th>
<th>Practice Sentences</th>
<th>Test Sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>V - NP&lt;sub&gt;definite&lt;/sub&gt; - NP&lt;sub&gt;definite&lt;/sub&gt;</td>
</tr>
<tr>
<td></td>
<td>Expected Answer: TRUE</td>
<td>Expected Answer: TRUE</td>
</tr>
<tr>
<td></td>
<td>Expected Answer: FALSE</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>(B)</td>
<td>(C)</td>
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<tr>
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<tr>
<td>4</td>
<td>4:02</td>
<td>TRUE</td>
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<tr>
<td>5</td>
<td>4:03</td>
<td>TRUE</td>
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<tr>
<td>6</td>
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</tr>
<tr>
<td>10</td>
<td>5:05</td>
<td>TRUE</td>
</tr>
</tbody>
</table>

References


Koizumi, Masatoshi, Yoshiho Yasugi, Katsuo Tamaoka, Jungho Kim, Juan Esteban Ajsivinac Sián, Sachiko Kiyama, and Lolmay Pedro Oscar García Máztar. Under review. On the (non-)universality of the preference for subject-object word order in sentence comprehension: A sentence processing study in Kaqchikel Mayan.


