

# Children Need More Information for Comprehension: Limits on the Agent-First Preference in Korean

Gyu-Ho Shin, Kamil Ud Deen, and William O’Grady

## 1. Introduction

It has frequently been observed for various languages that children are inclined to interpret the first noun in a sentence as an agent—the oft-mentioned *Agent-First preference* (Abbot-smith et al., 2017; Dittmar et al., 2008; Fisher, 1996; Slobin & Bever, 1982). The literature documents children’s heavy reliance on this preference in sentence comprehension: it emerges early (e.g., Bates & MacWhinney, 1982; Gertner et al., 2006; Gertner & Fisher, 2012; Yuan et al., 2012), and it is powerful enough to lead children down the garden-path in constructions such as passives (e.g., Abbot-Smith et al., 2017; Huang et al., 2013). The preference is consistent with the general tendency for the agent argument to occur in the initial position of a sentence (e.g., Dryer, 2013; Goldin-Meadow et al., 2008; Sinclair & Bronckart, 1972).

Together, these reports suggest the early emergence and universal application of the Agent-First preference as an intrinsic bias for comprehension across languages. We explore this preference in Korean, an SOV language with optional overt case marking, with a view to determining its possible interaction with other structural factors.

In Korean, the subject (and agent) in an active, actional transitive construction typically occurs in the initial position of the sentence (Im, 2007; Shin, 2006), yielding the canonical word order: a nominative-marked agent followed by an accusative-marked theme (1).

### (1) Canonical active transitive

Ciwu-ka	Minho-lul	cap-ass-ta.
Ciwu-NOM	Minho-ACC	catch-PST-SE <sup>1</sup>

‘Ciwu caught Minho.’

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<sup>1</sup> Abbreviation: ACC = accusative case marker; CASE = case marker (unspecified); NOM = nominative case marker; PST = past tense marker; SE = sentence ender.

Although Korean allows scrambling of pre-verbal arguments (Sohn, 1999), amongst the patterns with two overt arguments (and dedicated case marking), the canonical SOV pattern makes up more than 97 per cent of occurrences (Shin, under review).

This predominance seems to affect Korean-speaking children's comprehension of active transitives. To illustrate, the canonical pattern is interpreted more reliably than its scrambled counterpart (e.g., Jin et al., 2015; Kim et al., 2017), and the initial noun (in conjunction with case marking) in a sentence tends to be interpreted as the agent until the age of four, regardless of the sentence's word order (e.g., Cho, 1982; Kim et al., 1995; No, 2009; cf. Fisher, 1996). This predisposition to associate the agent with the initial noun also leads children to perform poorly on canonical passives, in which a theme appears initially (e.g., Kim et al., 2017; Shin & Deen, 2019).

A core property of Korean is its ability to drop both case markers and arguments if the omitted information can be inferred from the context (Sohn, 1999).

(2a) Omission: case marker

Ciwu-ka	Minho- <del>ka</del>	cap-ass-ta.
Ciwu-NOM	Minho-ACC	catch-PST-SE
'Ciwu caught Minho.'		

(2b) Omission: argument + case marker

<del>Ciwu</del> -ka	Minho-lul	cap-ass-ta.
<del>Ciwu</del> -NOM	Minho-ACC	catch-PST-SE
'(Ciwu) caught Minho.'		

In this paper, we ask how the Agent-First preference is affected by this kind of omission in Korean-speaking children's comprehension of canonical active transitive patterns in their language. Of the various potential factors that may promote (or inhibit) children's use of this preference, we focus on two structural factors: the number of overt arguments in a sentence and the presence of case marking. We are not aware of any experimental work that explores (1) whether the children apply the Agent-First preference uniformly to transitive patterns in which one argument is omitted, or (2) to what degree the presence of case marking contributes to the children's reliance on this bias.

## 2. Experiment: Picture Selection

In order to investigate whether and how the omission of arguments and/or case marking affects the Agent-First preference, we assessed children's comprehension of canonical active transitive patterns in which arguments and/or case markers were obscured. For this purpose, we devised a novel picture selection task for use in child-friendly contexts.

## 2.1. Participants

Children aged 3 to 4 years old ( $n = 30$ , mean age: 4;1) participated in the experiment. All were monolingual Korean speakers recruited from a preschool in Seoul, Korea. No participants reported any learning disabilities. Adult native speakers of Korean ( $n = 20$ , in their early- and mid-20s) were also recruited as a control group.

## 2.2. Stimuli

Sentences were created by using animals as agents and themes. Parts of test sentences were strategically obscured in three types of contexts: one involved the main character getting hungry and eating food, producing chewing sounds; another involved the main character who was sick and kept coughing; the third involved the main character becoming sleepy and yawning occasionally (Table 1). These sounds were used to obscure portions of the test sentences, as presented in Table 1; there were six instances of each pattern, amounting to 42 test sentences in total.

**Table 1. Stimuli by pattern**

Condition	Number of arguments	Case marking	Pattern	Example
(a)	2	Yes	N <sub>NOM</sub> N <sub>ACC</sub> V	dog-NOM cat-ACC kick
(b)	2	Yes (1 <sup>st</sup> )	N <sub>NOM</sub> N <sub>CASE</sub> V	dog-NOM cat-yummy kick
(c)	2	Yes (2 <sup>nd</sup> )	N <sub>CASE</sub> N <sub>ACC</sub> V	dog-cough cat-ACC kick
(d)	2	No	N <sub>CASE</sub> N <sub>CASE</sub> V <sup>1)</sup>	dog-cough cat-cough kick
(e)	1	Yes	N <sub>NOM</sub> V	dog-NOM kick
(f)	1	Yes	N <sub>ACC</sub> V	dog-ACC kick
(g)	1	No	N <sub>CASE</sub> V <sup>2)</sup>	dog-yawn kick

*Note.* 1) has no case marker to indicate the thematic roles of each argument, so this pattern can be interpreted as agent-first or theme-first. For the same reason, the sole argument in 2) can be interpreted as the agent or the theme.

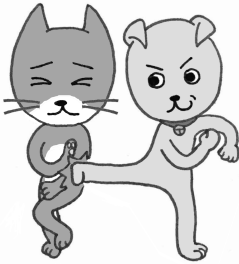
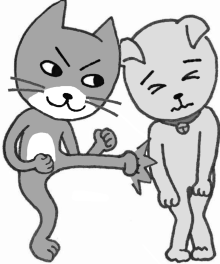
Sentences were recorded by a male native speaker of Korean who did not know their purpose; sound effects were recorded separately for later insertion. There was a 100-ms interval between the words in each sentence. Participants heard each sentence twice with a 1000-ms interval. All sentences, along with their corresponding pictures and recordings, were normed by 10 native speakers of Korean for their naturalness prior to the experiment.

### 2.3. Procedure

The experiment, which was conducted using *Psychopy* (Peirce, 2007), consisted of four sets based on the type of masking effect: no effect (conditions a, e, & f), chewing (condition b), coughing (conditions c-d), and yawning (condition g). After presentation of the no-effect sentences, which always came first, the remaining sets of test items were presented in a pseudo-random manner.

Participants were asked to join the main character in learning Korean and helping him; the actual task was to listen to what the main character said and to choose the picture that matched the utterance by pressing big arrows posted on the keyboard. Every item was accompanied by a pair of pictures involving the same action but reversed thematic roles, and a sentence corresponding to the target picture was presented orally (Table 2). The two pictures were presented first, and the test sentence was played 1000 ms later. Sets of the test items and the corresponding pictures appeared in random order.

**Table 2. Sample Test Item**

Picture			
Test sentence	koyangi-cough cat-cough 'The cat kicks the dog.'	kangaci-cough dog-cough 'The dog kicks the cat.'	cha-yo kick-SE

A training session with three practice items (subject-verb, object-verb, and verb-only sentences) was provided before the main session to familiarize participants with the procedure. The main session proceeded only if they succeeded on all three items. Participants received positive feedback, regardless of their choices. The entire session took approximately 15 minutes.

### 2.4. Analysis

Responses were coded as 0 (wrong) or 1 (correct) for all patterns that permitted just one interpretation. However, the scoring for  $N_{\text{CASE}}N_{\text{CASE}V}$  and  $N_{\text{CASE}V}$ , which can in principle be interpreted in more than one way, was based on the high likelihood of an agent-first interpretation (0: theme-first; 1: agent-first). All the data were fitted to logistic mixed-effects models using the *lme4* software package (Bates et al., 2015) with pattern as fixed effect and with participant and item as random effects. The models included the maximal random

effects structure with random intercepts and random slopes for all effects (cf. Barr et al., 2013). All statistical modelling and hypothesis testing were performed in R (R Core Team, 2016).

## 2.5. Prediction

The Agent-First preference is considered a general cognitive bias which emerges very early on. If this preference applies strongly to the children's comprehension across the board, we should see that their comprehension will not be particularly affected by the omission of arguments or case marking. We thus expect to see above-chance rates of the agent-first interpretation across the conditions. In particular, the children should demonstrate similar above-chance rates of preference for the agent-first interpretation in the  $N_{\text{CASE}}N_{\text{CASE}}V$  condition (d) (which can be interpreted as either agent-first or theme-first) and the  $N_{\text{CASE}}V$  condition (g) (which can be interpreted as the agent or the theme).

Alternatively, the two structural factors (number of arguments and the presence or absence of case marking) may affect children's reliance on the Agent-First preference in the comprehension of canonical active transitives in Korean. It is possible that these factors are intertwined with this preference, which would then be manifested only in conjunction with their occurrence. If this is the case, the extent to which children employ the Agent-First preference should be contingent upon the degree of omission of arguments or case marking. In particular, the children should have difficulty interpreting the  $N_{\text{CASE}}V$  condition (g), because it lacks both the factors that support this preference.

## 3. Results

Table 3 presents results of response by condition and group:

**Table 3. Response by Condition and Group**

Condition	Pattern	Example	Mean % (SD)	
			3-4-year-old	Adult
(a)	$N_{\text{NOM}}N_{\text{ACC}}V$	dog-NOM cat-ACC kick	84.44 (0.36)	100.00 (0.00)
(b)	$N_{\text{NOM}}N_{\text{CASE}}V$	dog-NOM cat-yummy kick	78.79 (0.41)	98.33 (0.13)
(c)	$N_{\text{CASE}}N_{\text{ACC}}V$	dog-cough cat-ACC kick	78.67 (0.41)	98.33 (0.13)
(d)	$N_{\text{CASE}}N_{\text{CASE}}V^1$	dog-cough cat-cough kick	66.67 (0.48)	90.00 (0.30)
(e)	$N_{\text{NOM}}V$	dog-NOM kick	94.44 (0.23)	93.33 (0.25)
(f)	$N_{\text{ACC}}V$	dog-ACC kick	92.22 (0.27)	100.00 (0.00)
(g)	$N_{\text{CASE}}V^1$	dog-yawn kick	42.59 (0.50)	66.67 (0.48)

<sup>1)</sup> The score in this condition indicates the mean proportion of agent-first responses, not mean accuracy *per se* (since neither interpretation is categorically right or wrong). Statistical comparisons between this condition and the others (except for the condition (f)) were possible because all the patterns have the agent-first interpretation.

The children performed well above-chance (84%) in the  $N_{\text{NOM}}N_{\text{ACC}}V$  condition (a). Their performance on the  $N_{\text{NOM}}N_{\text{CASE}}V$  condition (b) and the  $N_{\text{CASE}}N_{\text{ACC}}V$  condition (c), in which one of the case markers was not audible, was slightly less accurate (79% in both conditions), but not significantly so. Children's success on the  $N_{\text{CASE}}N_{\text{CASE}}V$  condition (d), where they would have had to rely solely on the Agent-First preference, was still above-chance but significantly less accurate (67%) in comparison to the corresponding full case marking pattern (a):  $\beta = -0.999$ ,  $SE = 0.391$ ,  $p = .011$ . This contrast (84% in (a) versus 67% in (d)) suggests that a pattern without case marking is more difficult to comprehend than one with complete case marking.

Crucially, the children were at-chance (43%) in the  $N_{\text{CASE}}V$  condition (g), where there was only one argument and no audible case marking. This indicates a failure to employ the Agent-First preference in this condition.<sup>2</sup> In contrast, retention of the case marker on the noun in the  $N_{\text{NOM}}V$  condition (e)<sup>3</sup> elevated children's success rates significantly to well above 90%:  $\beta = -3.132$ ,  $SE = 0.536$ ,  $p < .001$ . This improvement suggests that case marking (the nominative case marker) increased accuracy by supporting the Agent-First preference.

Children also demonstrated a significant difference between the two case-less patterns—the  $N_{\text{CASE}}N_{\text{CASE}}V$  condition (d) (67%) and the  $N_{\text{CASE}}V$  condition (g) (43%),  $\beta = -0.992$ ,  $SE = 0.379$ ,  $p = .009$ . The low rate of agent preference in condition (g) in comparison to condition (d) suggests that a pattern with a solitary case-less noun is more challenging than one with two case-less nouns when it comes to employing the Agent-First preference.

#### 4. Discussions and conclusion

We probed how the Agent-First preference applies to Korean-speaking children's understanding of the canonical active transitive patterns with varying degrees of omission of arguments and/or case marking. For this purpose, we conducted a picture selection task by obscuring parts of test sentences in child-friendly, novel contexts. Two major findings are: (i) 3-4-year-olds were at-chance in the  $N_{\text{CASE}}V$  condition (g), and (ii) the presence of a second noun or of nominative case marking increased responses consistent with the Agent-First preference.

The finding that children demonstrated at-chance performance on the  $N_{\text{CASE}}V$  condition (g) is at odds with the prediction that the Agent-First preference should be activated independently of other factors. Evidently, children were uncertain about the thematic role of a sentence-initial nominal when it is both the only

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<sup>2</sup> Interestingly, adult controls demonstrated 67 per cent rate of the agent-first response in this condition at most.

<sup>3</sup> The  $N_{\text{ACC}}V$  condition (f) was designed to check whether participants had knowledge of the accusative case marker (indicating the theme), and it did not relate to the agent-first interpretation. Therefore, we excluded this condition from the main discussion.

argument in the sentence and lacks case marking. Our adult participants also struggled with this condition (with an agentive interpretation 67% of the time), but if children (unlike adults) rely on the Agent-First preference, we would expect a level of performance higher than chance, which was not the case. What we found is thus inconsistent with previous reports that the Agent-First preference is an intrinsic comprehension bias for children across languages (e.g., Abbot-Smith et al., 2017; Gertner et al., 2006; Huang et al., 2013).

The second finding involving the benefits of an additional argument or of case marking for the Agent-First preference extends the implications of the first finding. In particular, it appears that the Agent-First preference does not operate independently, but rather is associated with other grammatical cues. In comparison to the  $N_{\text{CASE}V}$  condition (g), children improved their agent-first interpretation to an above-chance level both in the  $N_{\text{CASE}N_{\text{CASE}V}}$  condition (d) (67%) and in the  $N_{\text{NOM}V}$  condition (e) (94%). This reveals the role of structural factors such as the number of overt arguments and the presence of case marking in children's use of the Agent-First preference, supporting the idea that activation of this bias is tied to these factors (at least in Korean).

Moreover, there is a reason to think that case marking increases the strength of the Agent-First preference more than the presence of a second noun. The key evidence comes from the fact that the children performed significantly better in the  $N_{\text{NOM}V}$  condition (e) (94%) than in the  $N_{\text{CASE}N_{\text{CASE}V}}$  condition (d) (67%):  $\beta = 2.176$ ,  $SE = 0.569$ ,  $p < .001$ . This contrast implies that the nominative case marker has a greater influence than the presence of a second noun on use of the Agent-First preference.

The reason for this asymmetry may be related to the fact that the  $N_{\text{CASE}N_{\text{CASE}V}}$  condition (d) can in principle be interpreted as either canonical or scrambled (although the latter possibility is less likely; Shin, under review). This factor may have affected children's interpretation of the pattern to some extent. In contrast, the nominative case marker is very reliably associated with the agent in a transitive sentence (e.g., Shin, under review), which may have provided a strong basis for the children to deploy the Agent-First preference for the comprehension of the  $N_{\text{NOM}V}$  condition (e).

More broadly, the developmental trend that we have uncovered is ascribable to the linguistic input that children normally receive (cf. Rowland, Noble & Chan, 2014). Caregiver input relating to transitive sentences in Korean is skewed towards a canonical pattern, with a strong association between the nominative case marker and the agent (Shin, under review; see also Cho, 1982; Lee, 2004). These input characteristics may encourage children to associate comprehension heuristics such as the Agent-First preference with additional factors, such as the number of overt arguments and particular types of case marking.

Given that children must deal with additional cues in their use of the Agent-First strategy, it makes sense that they would first attend to the local pairing that maps the nominative-marked nominal onto agent-hood, before becoming sensitive to the broader-scope distributional cue involving the presence of a second argument (cf. Wittek & Tomasello, 2005). This interpretation of our

results also aligns with previous reports on the role of case marking for comprehension in early childhood (e.g., Göksun et al., 2008; Suzuki & Kobayashi, 2017; Ural et al., 2009; cf. Fedzechkina et al., 2017).

In sum, our findings suggest that the Agent-First preference in Korean-speaking children's comprehension occurs only in conjunction with other types of grammatical cues (the number of overt arguments and case marking) and does not function independently of them. Contrary to the widely-held belief, there is no stand-alone Agent-First Preference *per se* in the acquisition of Korean.

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