Word Order, Case Marking, and Verbal Morphology in Children's Comprehension of Suffixal Passives in Korean

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1. Children's Acquisition of Passives

A commonly known fact is that passives pose a challenge for young children in a variety of languages (English: Borer & Wexler, 1987; de Villiers & de Villiers, 1973; Fox & Grodzinsky, 1998; Israel, Johnson & Brooks, 2000; Nguyen & Snyder, 2017, amongst many others; Japanese: Sano, Endo & Yamakoshi, 2001, Mandarin Chinese: Huang, Zheng, Meng & Snedeker, 2013; Spanish: Pierce, 1992; though c.f. Demuth, 1989 and Suzman, 1987 for the early acquisition of passives in Sesotho and Zulu, respectively). Various proposals address the reason behind this challenge, including the idea that low input/usage frequency affects the acquisition of the passive (e.g., Brooks & Tomasello, 1999; Gordon & Chafetz, 1990), argument movement poses a challenge (e.g., Borer & Wexler, 1987; Wexler, 2004), and difficulty with thematic role transmission (e.g., Fox & Grodzinsky, 1998), amongst others.

Another possible explanation for the difficulty of the passives comes from the mismatch between thematic role ordering and grammatical relations of arguments (e.g., Bever, 1970; O'Grady & Lee, 2005). Typically, in active transitive patterns, an agent is mapped onto a subject and a theme is mapped onto an object (e.g., Brown, 1973). In the passive, however, the mapping relation is reversed: the theme is mapped to the subject and the agent occurs as an oblique. The logic is that children acquire the canonical mapping of thematic roles early on (agent→subject, theme→object), and this then shapes their understanding passives (incorrectly).

The passive pattern of thematic role ordering (theme→subject; agent→oblique) also goes against the typologically common agent-first tendency (e.g., Dowty, 1991; Dryer, 2013; Goldin-Meadow, So, Özyürek & Mylander, 2008) whereby languages usually encode the agent as the first nominal argument in a clause. The passives violate this tendency because the agent occurs in a post-verbal position (in languages like English), often as an oblique. Children indeed appear to have difficulty revising their initial mapping between thematic roles and

grammatical relations in understanding the passives (Huang et al., 2013; Deen, Bondoc, Camp, Estioca, Hwang, Shin, Takahashi, Zenker & Zhong, 2018). On this view, then, the challenge for children is to perceive the mismatch between thematic roles and grammatical relations in the passives and deduce the precise thematic roles of each argument.

The present study explores children's comprehension of suffixal passives in Korean with respect to three factors (*word order*, *case marking*, and *verbal morphology*) that contribute to this mapping discrepancy. Active transitive sentences in Korean typically occur with the agent first, case-marked nominative, and the theme second, case-marked accusative. The verb carries no dedicated active morphology *per se*. Passives (of the kind considered here; see below), on the other hand, occur with the theme first, case-marked nominative, and the agent second, case-marked dative; the verb carries dedicated passive morphology. Moreover, Pre-verbal arguments in both patterns can be scrambled. Thus, passives pose the familiar challenge for Korean children since comprehension requires resolving the mapping discrepancy between thematic roles and grammatical relations, and this involves identification and integration of word order, case marking, and verbal morphology. In this paper, we report on three experiments addressing the relative impact of each of these three factors in the comprehension of active and passive sentences.

2. Three Types of Passives in Korean

There are three types of passives in Korean: suffixal, lexical, and periphrastic passives (Kim, 2005; Sohn, 1999; Song & Choe, 2007; see Yeon, 2015 for the comprehensive review). Suffixal passives – the target structure of this paper - are the most common kinds of passive, and are formed by the markers *-i, -hi, -li,* or *-ki* attaching to a verb stem with an *-i/ka*-marked subject denoting a theme and an *-eykey/hanthey*-marked oblique denoting an agent (1a). The dative marker *-hanthey* is used more frequently than *-eykey* in colloquial and casual contexts. Lexical passives (1b) involve no passive marker, but the meaning of the verb (e.g., *mac-* 'be hit') is one of affectedness. Moreover, case marking is the same as suffixal passives, cementing their status as true passives. In periphrastic passives (1c), the theme is expressed by *-i/ka* but the agent is expressed mostly through *-ey uyhay*, not through *-eykey/hanthey*. This type of passives also has a suffix *-e/a* and an inchoative verb *ci-* 'to become' after the verb stem.

(1) a. totwuk-i   kyengchal-hanthey cap-hi-ess-ta.
    thief-NOM police-DAT   catch-PSV-PST-SE[1]
    'The thief was caught by the police.'

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[1] Abbreviation: ACC = accusative case marker; DAT = dative marker; NOM = nominative case marker; PSV = passive suffix; PST = past tense marker; SE = sentence ender

b. chelswu-ka   minho-eykey mac-acc-ta.
  chelswu-NOM minho-DAT get.hit-PST-DC.
  'chelswu was/got hit by minho.'
c. chayk-i   chelswu-ey uyhay ccic-eci-ess-ta.
  book-NOM chelswu-by   tear-become.PSV-PST-SE
  'The book was torn by chelswu.'

All three types of passives are rare in the input, but of the three passive types, lexical and periphrastic passives are extremely rare (e.g., Lee & Lee, 2008). We thus focus on suffixal passives in this paper.

3. Determining Thematic Roles in Korean Suffixal Passives

As mentioned briefly above, three factors are involved in the process of determining thematic roles of arguments in Korean suffixal passives: *word order*, *case marking*, and *verbal morphology*.

Word order is important in assigning thematic roles because we know from decades of research that children acquire the canonical word order of their language very early in development (e.g., Golinkoff, Hirsch-Pasek, Cauley & Gordon, 1987). This means that they acquire the fact that, in English for example, the subject comes before the verb, whereas the object follows the verb, and in Korean, that the subject precedes the object. In terms of thematic roles, because subjects are most often agents, and objects are most often themes, children learn that agents precede themes. This establishes an expectation that the first nominal encountered when listening to a sentence is likely an agent – an expectation that is well-documented (e.g., Cho, Lee, O'Grady, Song, Suzuki & Yoshinaga, 2002; Kim, O'Grady & Cho, 1995; cf. Slobin & Bever, 1982). This expectation poses a challenge for children in understanding passive sentences where the theme argument precedes the agent. Counter-intuitively, this logic suggests that scrambled passives (2) may be easier for children since scrambling restores the canonical thematic role ordering to agent-before-theme.

(2) kyengchal-hanthey totwuk-i   cap-hi-ess-ta.
  police-DAT   thief-NOM catch-PSV-PST-SE
  'The thief was caught by the police.'

Likewise, strong evidence exists that shows that Korean children acquire the nominative marker -*i/ka* (as indicating the subject) as early as 18 to 20 months (e.g., Bae, 1997; Lee, 2004; Lee, Jang, Choi & Lee, 2008), and that the -*i/ka* marked nominal is typically interpreted as the agent of the event (Clancy, 1995; Kim, 1997; Lee & Cho, 2009). In the case of the passives, however, the theme is marked with the nominative marker whilst the agent is marked by the dative marker -*eykey*/*hanthey*[2]. These differences require children to acquire two facts

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[2] -*ey* is also used to denote an agent in passives, but only inanimate agents (Sohn, 1999). We limit our discussion to animate agents.

simultaneously: a noun marked by the nominative marker is not the agent (but is the theme) in the passives, and there is a new association of the dative marker and the agent only for the passives.

And finally, in the passive, the verb is marked with one of four suffixes (*-i, -hi, -li,* and *-ki*). When listening to a sentence that has a nominative-marked argument, the passive suffix serves as a key disambiguation point since it is only this suffix which tells the listener that the nominative-marked argument is not in fact the agent of the event. So sensitivity to the verbal suffix is crucial for successful comprehension of passives in Korean.

In sum, there are at least three potential factors involved in the comprehension of Korean suffixal passives: *word order* (agent-theme vs. theme-agent), *case marking* (nominative-first vs. dative-first), and *verbal morphology* (a passive suffix). If children employ the agent-first strategy, we expect better accuracy in comprehension of scrambled passives than canonical passives. If children are sensitive to the use of case marking, this may ameliorate the effect of the agent-first strategy and raise accuracy rates. And finally, if children are sensitive to the passive suffix on the verb, they may be able to revise their initial (incorrect) mapping, which would raise accuracy rates for passives.

4. The Present Study

We designed three experiments to measure the degree to which the three factors (*word order*, *case marking*, and *verbal morphology*) exert influence on children's comprehension of Korean suffixal passives. Experiment 1 investigated children's general understanding of canonical and scrambled full passives as a baseline. Experiment 2 assessed the effect of word order by audibly obscuring case markers and verbs completely from the test items (explained in detail below). Experiment 3 (in comparison to Experiment 2) examined the impact of case marking by removing information about verbal morphology from the test sentences (using a similar aural manipulation to Experiment 2). Using this method, we were able to individually isolate the effects of each factor in the comprehension of the passives in child native speakers of Korean.

4.1. Experiment 1: Canonical and scrambled full passives
4.1.1. Methods
4.1.1.1. Participants

Children aged 3 to 4 years old (*n*=30, mean age: 4;1) and 5 to 6 years old (*n*=19, mean age: 6;1) participated in the experiment. They were monolingual Korean speakers recruited from a preschool in Seoul, Korea. No participants reported any learning disabilities. Adult native speakers of Korean (*n*=20, early- and mid-20s) were also recruited as a control group.

4.1.1.2. Stimuli and Procedure

A total of six canonical and six scrambled suffixal passives as in (3a-b) were created by using animals as agents and themes. We controlled for the animacy of arguments to make each stimulus semantically reversible and to make the stimuli child-friendly. Moreover, 12 filler items (active transitives; 4a-b) were included. All sentences were normed by 10 native speakers of Korean, and then the sentences were recorded prior to the experiment. As this condition included the distinction of canonical and scrambled word order, two pseudo-randomised sub-lists were made to avoid possible interference from the same action within the same list.

A picture selection task was conducted (Figure 1). Children were presented with either a canonical passive (3a) or a scrambled passive (3b), or a filler item (4a-b). Each test item and filler 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 aurally twice with a one-second interval. 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. A training session with 3 practice items (subject-verb, object-verb, and verb-only sentences) was conducted before the main task to familiarize participants with the procedure. The main experiment proceeded only if children succeeded on all the three items.
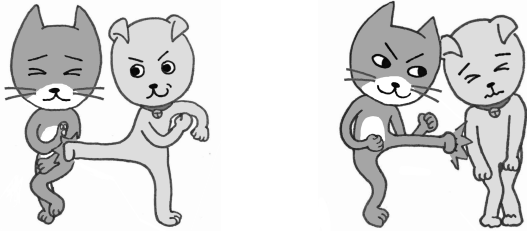
Picture	
Test Sentence	koyangi-ka kangaci-hanthey cha-i-eyo cat-NOM dog-DAT kick-PSV-SE 'The cat is kicked by the dog.'

Figure 1. Sample Test Item for Experiment 1 (canonical passive)

(3) a. Canonical suffixal passive
　　　koyangi-ka kangaci-hanthey cha-i-eyo.
　　　cat-NOM   dog-DAT   kick-PSV-SE
　　　'The cat is kicked by the dog.'
　　b. Scrambled suffixal passive
　　　kangaci-hanthey koyangi-ka cha-i-eyo.
　　　dog-DAT   cat-NOM   kick-PSV-SE
　　　'The cat is kicked by the dog.'

(4) a. Canonical active transitive
　　wenswungi-ka kaykwuli-lul tul-eyo.
　　monkey-NOM frog-ACC　　lift-SE
　　'The monkey lifts the frog.'
　b. Scrambled active transitive
　　kaykwuli-lul　wenswungi-ka tul-eyo.
　　monkey-ACC frog-NOM　　lift-SE
　　'The monkey lifts the frog.'

4.1.1.3. Analysis

　　Children's responses were coded as 0 (wrong) or 1 (correct). All the data were submitted to a logistic mixed-effects model using the *lme4* software package (Bates, Maechler, Bolker & Walker, 2015) with canonicity and group as fixed effects 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, Levy, Scheepers & Tily, 2013). All statistical modeling and hypothesis testing were performed in R (R Core Team, 2016).

4.1.2. Results

　　Considering the active filler items first, children did much better on the canonical actives (82.99%) than the scrambled actives (62.59%). This is consistent with the agent-first strategy: children assume that the first nominal in the sentence is the agent. In canonical active patterns, this is consistent, and this leads to high accuracy rates. However, with scrambled actives, this predilection to assume the first nominal is the agent leads to degraded accuracy rates.

　　Turning to passives (Table 1), whereas children aged 3-4yrs were at-chance, regardless of canonicity, 5-6yr-olds were above chance in both conditions. However, no difference was found in either pattern within the groups and also in the canonical passives between the groups, indicating that children's performance was rather uniform across the group. These findings suggest that passives are difficult for children to acquire in general, which parallels previous studies. Unclear at this point is the role of the agent-first strategy in comprehension of passives since passives involve both unusual thematic argument ordering, as well as unusual case marking and unusual verbal morphology.

Table 1. Performance by group: Experiment 1

Condition	Group	Correct response (%)
	3-4yr-old	51.11
Canonical passives	5-6yr-old	63.16
	Adult	98.33
	3-4yr-old	46.67
Scrambled passives	5-6yr-old	61.40
	Adult	96.67

The next experiment was designed to address these complications. In order to assess the effect of case marking on children's understanding of passives, we strategically obscured case markers from the experimental stimuli so that children could no longer use case marking information to help (or hinder) their comprehension. We also obscured verbs so that children could not hear them in the stimuli. Thus, all that children heard in this next experiment were Noun-Noun sentences without case markers and verbs, thereby giving us a glimpse into the pure effect of word order.

4.2. Experiment 2: Two nouns only, without case markers and verbs
4.2.1. Methods
4.2.1.1. Participants

Monolingual 3-4yr-olds (n=28, mean age: 4;13) and 5-6yr-olds (n=18, mean age: 6;14) were recruited from a preschool in Seoul, Korea, none of whom reported any learning disabilities. Another 20 adult native speakers of Korean in their early- and mid-20s participated as a control group.

4.2.1.2. Stimuli and Procedure

We devised a novel situation where the main character was hungry and was eating ravenously. This character would occasionally talk whilst eating, and so yum-yum sounds occurred at various points of the test sentences. We strategically placed these yum-yum sounds to mask the case markers and the verbs. The test items were pre-recorded with the yum-yum sounds obscuring every case marker and verb, as in (5). The native speaker recording the base sentence was unaware of the experimental hypothesis, nor of the intent to subsequently obscure parts of the sentence. The resulting test sentence consisted of just two nouns (plus the yum-yum-obscured parts of the sentence), and so the test items could be interpreted as either agent-first or theme-first. Thus, this is the purest measure of whether children have an agent-first preference. In all, children heard 5 test sentences. No fillers were included since the obscuring of case markers and verbs rendered this moot.

(5) wenswungi*yum-yum* kaykwuli*yum-yum* *yum-yum*
    monkey(-NOM)   frog(-ACC)   (pat-SE)
    'The monkey (is patting) the frog.' or 'The frog (is patting) the monkey.'

Participants' responses to this yum-yum manipulation were extremely positive: upon encountering the stimuli, all children and even adults enjoyed the humour and novelty of it a great deal. All other details of this experiment were the same as in Experiment 1.

4.2.2. Results

3-4yr-olds were at-chance, indicating that their judgment was not so much skewed towards either an agent-first or a theme-first preference. In contrast, 5-6yr-olds showed above-chance performance towards the agent-first preference, which was also close to the performance of adults. The difference of the responses between the groups was statistically significant (β=1.30, *SE*=0.33, *p*<.001), suggesting that 5-6yr-olds tended to understand two-noun sequences reliably on the basis of an agent-first word order whilst 3-4yr-olds did not.

Table 2. Performance by group: Experiment 2

Condition	Group	Agent-first response (%)
	3-4yr-old	55.71
Two nouns only	5-6yr-old	82.22
	Adult	91.00

This is somewhat unexpected since the agent-first preference is generally seen as a non-grammatical heuristic that children (and perhaps adults too) employ when other sources of information are unavailable. Moreover, it is generally thought that the agent-first preference is something that diminishes in strength as children age. What we are showing, however, is that younger children seem not to rely strongly on this preference, but older children do. This suggests either that this preference kicks in after accumulation of sufficient linguistic knowledge, or that the test items were so under-informative that 3-4yr-olds were simply unable to cope with the test sentences.

To address this final possibility, and to gauge the relative impact of case markers, in our final experiment, we put case markers back in the test items but still obscured verbs, thus allowing us to measure the impact of case marking in comparison to the results of Experiment 2.

4.3. Experiment 3: Passives without verbs
4.3.1. Methods
4.3.1.1. Participants

Monolingual 3-4yr-olds (*n*=30, mean age: 4;1) and 5-6yr-olds (*n*=19, mean age: 6;1), none of whom reported any learning disabilities, participated in this experiment. 20 adult native speakers of Korean in their early- and mid-20s were also recruited as a control group.

4.3.1.2. Stimuli and Procedure

Recall that, in Korean suffixal passives, the theme is case-marked nominative whilst the agent is case-marked dative, and canonically the theme precedes the

agent. In our stimuli, we included six canonical (N-NOM + N-DAT) and six scrambled (N-DAT + N-NOM) items, all of which had the verb obscured (6a-b). For this purpose, we devised another novel situation where the main character got sick and coughed a lot. We strategically placed these coughing sounds over the verb, thus obscuring the verb. Note that the presence of the dative-marked nominal should signal that these test items are indeed passive sentences, despite the absence of verbal morphology. We included 12 fillers (active transitives; 7a-b) whose nouns were marked nominative and accusative (thus signaling that they are actives). All the other specifications were the same as those in Experiments 1 and 2.

(6) a. Canonical suffixal passive
    napi-ka   kkwulpel-hanthey *cough*
    butterfly-NOM honeybee-DAT   (poke PSV SE)
    'The butterfly (is poked) by the honeybee.'
  b. Scrambled suffixal passive
    kkwulpel-hanthey napi-i   *cough*
    butterfly-DAT   honeybee-NOM (poke PSV SE)
    'The butterfly (is poked) by the honeybee.'
(7) a. Canonical active transitive
    koyangi-ka kangaci-lul *cough*
    cat-NOM   dog-ACC (kick SE)
    'The cat (kicks) the dog.'
  b. Scrambled active transitive
    kangaci-lul koyangi-ka *cough*
    cat-ACC   dog-NOM (kick SE)
    'The cat (kicks) the dog.'

4.3.2. Results

Across the groups, children performed below-chance in canonical passives but at-chance in scrambled passives (Table 3). In particular, the differences between canonical and scrambled passives were significant in 3-4yr-olds (β=1.28, SE=0.34, $p<.001$) and in 5-6yr-olds (β=1.23, SE=0.55, $p<.05$). No significant difference was found within the same patterns, indicating that children's behaviour in each pattern was uniform across the groups.

Table 3. Performance by group: Experiment 3

Condition	Group	Correct response (%)
Canonical passives	3-4yr-old	31.11
	5-6yr-old	26.32
	Adult	70.00
Scrambled passives	3-4yr-old	58.89
	5-6yr-old	50.88
	Adult	75.00

The results suggest that case markers play an important role in the comprehension of Korean suffixal passives. When children encountered the nominative case marker first without the passive marker on the verb (canonical passives), they appear to assign that first nominal argument the agent role. This can be seen by comparing the significantly-below-chance performance on canonical passives in Experiment 3 with the at-chance (3-4yr-olds) or above-chance (5-6yr-olds) responses towards the agent-first pattern on the two-nouns-only condition in Experiment 2. This drop in accuracy in Experiment 3 is because children encountered the nominative case marker, which (incorrectly) led them down the garden-path of a canonical active pattern. Interestingly, it seems like children were unable to recover from this misanalysis of the pattern even after the appearance of the dative marker (see Choi & Trueswell, 2010; Snedeker & Trueswell, 2004 for more discussion about children's difficulty in revising the initial sentential parse after encountering contradictory information which arrives later in the same sentence). Children's responses to filler items also match this interpretation: accuracy rates were better in canonical (74.15%) than scrambled active transitives (50.34%), suggesting the strong reliance on case marking to assign the agent role to that initial nominal argument.

Both groups of children were more accurate with the scrambled passives than canonical passives. This may be because when children encounter a dative-marked nominal argument first (scrambled passives), they recognise it as unusual and do not commit to an agent-first analysis. However, it is unclear whether case marking indeed played a role here or they simply ignored the dative case marker and followed their preference for an agent-first analysis. Also unanswered is the degree to which verbal morphology affects children's comprehension of suffixal passives. We revisit each point in the next section by comparing results of the three experiments altogether.

5. Interaction of the three factors in comprehending suffixal passives in Korean

The comparison of results from Experiments 1 and 3 shows that children performed better with verbal morphology than without verbal morphology in the comprehension of canonical passives (Figure 2). We found significant differences within canonical passives contingent on the existence of a passive marker both in 3-4yr-olds (β=1.00, SE=0.48, p=.038) and in 5-6yr-olds (β=2.55, SE=1.07, p=.018). In contrast, no difference was found in scrambled passives across the verb conditions and the groups, indicating the uniformity of children's performance in scrambled passives.
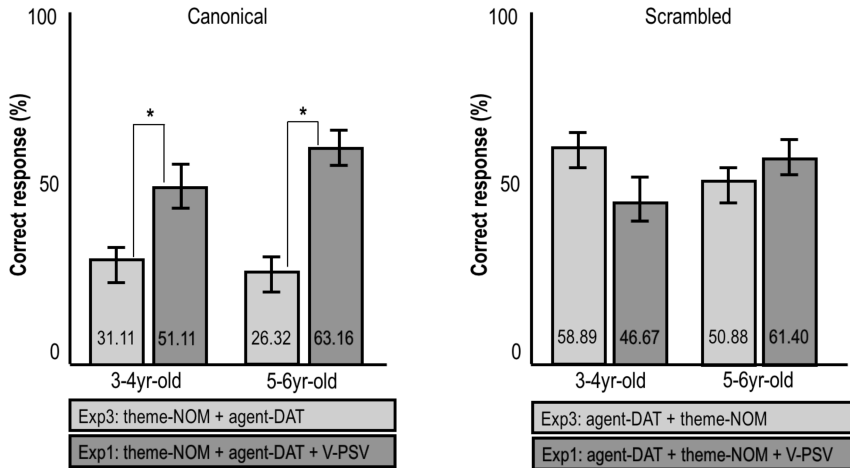
Figure 2. Comparison by condition: Experiments 1 and 3

The fact that children showed increased accuracy in Experiment 1 compared to Experiment 3 suggests that they are sensitive to the verbal morphology. In Experiment 3, where no verbal cue is available, they more robustly enforce the agent-first preference. However, in Experiment 1, the presence of that verbal cue allows at least some of the children, some of the time, to revise that initial misparse and to reassign thematic roles. This was clearly observed in 5-6yr-olds' results, showing an improved understanding of canonical passives from Experiment 3 to Experiment 1 (with above-chance performance).

With this in mind, let us reconsider the results from Experiment 1. We found no difference across canonicity of the passives, but we suggest here that this apparent null result is actually illusory. In canonical passives, children initially assume the first nominal is the agent. It is, after all, nominative-marked. The second nominal is dative marked, which may raise questions in the mind of the child, and when the child encounters the verbal passive morpheme, this morpheme affords the child an opportunity to re-calculate the association of thematic roles and grammatical relations of arguments. Together, this yields a higher rate of success in Experiment 1 than in Experiment 3.

In scrambled passives, on the other hand, the first nominal encountered is dative-marked. This case marker may signal to the child that it is dealing with a non-canonical sentence, and so the child does not commit to any analysis of the sentence. The second nominal, being nominative-marked, suggests that the thematic order of the sentence is agent-theme, and upon encountering the passive verbal morpheme, the child's hypothesis is confirmed. This accounts for why there was no difference across passive types: children were using different cues to arrive at the same conclusion.

It seems, therefore, that when children comprehend passives, their reliance on word order information is affected by both case marking and verbal morphology.

As a final remark, there is a possibility that case marking information is employed with the help of the passive suffix. Children, independent of the age groups, behaved differently across the experiments in canonical passives: they performed better in the condition involving verbal morphology (51.11% for 3-4yr-olds and 63.16% for 5-6yr-olds) than in the condition without verbal morphology (31.11% for 3-4yr-olds and 26.32% for 5-6yr-olds). The different behaviour found in canonical passives stands as an indication that the passive suffix provides an opportunity for children to recognise the dative marker. In other words, the question is not which factor affects the comprehension of the passive in Korean. Rather, the question is how the three factors rely on each other during comprehension. It seems that case marking in Korean passives is useful for children only when the verb is marked with passive morphology. This two-factor comprehension strategy is something that we pursue in future research.

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