Priming of the passive structure from short and full passives with Japanese children and adults

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all participants for cooperation
and all the audience at FAJL 7 for valuable comments
1. Background on the acquisition of the English passive structure.

2. Recent study about English-speaking children using syntactic priming paradigm; Messenger et al. (2011)

3. Background on the acquisition of the Japanese passive structure.

4. Our goals and experiment

5. Discussion
Full and short passives in English and Japanese

**ENGLISH PASSIVES**
- Full passive: (1a) The fox is being kicked by the elephant.
- Short passive: (1b) The fox is being pulled.

**JAPANESE PASSIVES**
- Full passive: (2a) きつねがぞうにけられてる
  - kitsune-ga zou-ni ker-are-teru
  - fox-NOM elephant-by kick-PASS-PROG
- Short passive: (2b) きつねがけられてる
  - kitsune-ga ker-are-teru
  - fox-NOM kick-PASS-PROG

Short and full passive structure of adults.

NP movement (A-chain)
## Acquisition of English passive structures

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Children’s adjectival passive structure

This adult-like passive structure takes time for children to acquire.

Short and full passive structure of adults.

Before the maturation occurs, English children might assign adjectival structure to short passive. (Borer and Wexler, 1989)
### Acquisition of English passive structures

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tested 16 children (mean age 4;1) and 16 adults, within participants design

RESULTS: They showed that three- to four-year-old English-speaking children were more likely to produce full passives following short passives than following active primes.
Messenger et al. claimed that, in both adults and children, a common representation is accessed for processing short passives and full passives. However, to claim a common representation for short and full passives they need to show a priming effect of the passive structure to a similar extent from full and short passive primes.

**OUR RESEARCH:**
we investigated priming effects with both full and short passive structures.
Acquisition of Japanese passives

Minai (2000); Sugisaki (1999)
5- and 6-year-old children still experience difficulty in processing passives.

Sano, Endo and Yamakoshi (2001)
Japanese children show delay in acquiring the passive structure compared to English children.

5-year-old children show poor performance with full passives in the comprehension experiment.

Japanese children show delay in acquiring passive structures compared to English children because Japanese short passive cannot be assigned adjectival passive structure. (Sano, 2013)

Acquiring full passive is more difficult than short passive due to thematic-role assignment to noun in -ni (by) phrase. (Theta-transmission)
Other possible reasons for the delay

✓ Japanese passives are more difficult than English passives?

| full passive with \(-ni\) and a transitive verb | ぞうが | うさぎに | さわられる | 象はラビットに触れられるのを | sawar-are-teru touch-PASS-PROG |
| active with \(-ni\) and a transitive verb | ぞうが | うさぎに | さわってる | 象はラビットを触るのを | sawa-tteru touch-PROG |

NP + \(-ni\) is ambiguous; \(-ni\) does not provide a clear cue for identifying the passive structure. (dative, locative/instrumental, or by-agent)

The informative verb appears at the end of the sentence; in Japanese, a head-final language.

Japanese full passives may be garden-path sentences!
Main predictions: Common representation

MAIN PREDICTION:
If Japanese 4 to 6 years old children can access a common representation for full and short passives, they should produce full passives after hearing short passive primes (and possibly vice versa).

Another possibility is that there may be extra difficulty for producing full passives, so they may produce short passives after hearing full and short passive primes.

Alternatively...
If Japanese children use different representations for the two types of passives, they should produce sentences with the same structure as their respective primes. Yet another possibility is if they have acquired only short passives, a priming effect would only occur with short passives, but not with full passives.
Our second goal: examining learning effects

✓ Recent studies (Chang et al. 2006) proposed that syntactic priming is a form of implicit learning. (priming occurs due to an error-correction mechanism.)

✓ This account predicts the greater the prediction error in processing prime sentences, the stronger the priming effect would be.

PREDICTION FOR OUR STUDY:
The magnitude of priming of the passive structure should decrease over the course of experiment (trial-by-trial priming).

We also predict that the probability of producing passive descriptions will increase over the course of experiment. (cumulative priming, Bencini and Valian, 2007)
The aim of the current study

1. To investigate whether children access the same syntactic representation for full and short passives, we examined the priming effect with both full and short passive structures.

2. We tested Japanese full and short passives with young Japanese children because they seem to experience greater difficulty to acquire passives compared to English speaking children.

3. We investigated whether learning occurs for both children and adults.
Our experiment: Participants

✓ 40 children: 4;07 - 6;04, mean age 5;02
   (One was eliminated because of recording error. 41 - 1 = 40)
   (Tsuda nursery and Ogawa nursery in Kodaira, Tokyo)

<table>
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<tr>
<th></th>
<th>4 year old</th>
<th>5 year old</th>
<th>6 year old</th>
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<td>Number</td>
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<td>20</td>
<td>13</td>
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✓ 20 undergraduate students: 4 males and 16 females
   (The University of Tokyo and Tsuda College, Tokyo)
(a) ACTIVE PRIME

Buta-ga Kaeru-o Ket-ter-u-yo  
pig-NOM frog-ACC kick-PROG-PRES-ART
“The pig is kicking the frog.

(b) FULL PASSIVE PRIME

Kaeru-ga Buta-ni Ker-are-ter-u-yo  
frog-NOM pig-by kick-Passive-PROG-PRES-ART
“The frog is being kicked by the pig.

(c) SHORT PASSIVE PRIME

Kaeru-ga Ker-are-teru-yo.  
frog-NOM kick-Passive-PROG-PRES-ART
“The frog is being kicked.
Our experiment: Material

- 18 sets of prime and target pictures/sentences
  - different 9 transitive events, repeated once across items
  - no overlapping of verbs between prime and target in a trial
  - comprehension of these verbs was tested in the pilot stage.

<table>
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<th>9 verbs for PRIME</th>
<th>9 verbs for TARGET</th>
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<td>触る (touch), 捕まえる (catch), つつく (poke), 握る (grasp), くすぐる (tickle), 起こす (wake up), 濡らす (wet), 転がす (roll), 倒す (push down)</td>
<td>洗う (wash), 押す (push), 抱っこする (hold), 引っ張る (pull), 追いかける (chase), 踢る (kick), 叩く (hit), 撫でる (pat), 舐める (lick)</td>
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- No overlap of animal characters between prime and target in a trial.
- Animal’s position is balanced: Half of the agents were on the left in a picture, and half were on the right.
- Within-item and within-participant design: each target occurred once in each of 3 priming conditions.
- 18 filler items: each, different intransitive verb with 1 or 2 animals
Our experiment: Procedure

ACTIVE
Zou-ga Kirin-wo Tutui-ter-u-yo
Elephant-NOM Giraffe-ACC poke-PROG-PRES
“The elephant is poking the giraffe.

FULL PASSIVE
Kirin-ga Zou-ni Tutuk-are-ter-u-yo
Giraffe-NOM elephant-by poke-PASS-PROG-PRES
“The giraffe is being poked-by the elephant.

SHORT PASSIVE
Kirin-ga Tutuk-are-ter-u-yo
Giraffe-NOM poke-PASS-PROG-PRES
“There is no difference in meaning.}
% of passive productions in target trials in children

Children produced more passive descriptions following both full and short passive prime than following active primes.

We analyzed the number (logit) of passive descriptions against all other types of descriptions using Linear Mixed-Effects models with a binomial function.
We did not find difference in the pattern of responses among the 3 age groups.
% of passive productions in target trials in adults

Adults produced more passive descriptions following both full and short passive prime than following active primes.

A***  B***  C n.s.
Combined analysis

% of passive productions in target trials in children and adults

We found greater magnitude of priming for adults than for children.
There was no difference in the magnitude of priming between the full and short passive prime conditions for both children and adults.

Children of all age groups as well as adults accessed a common representation for full and short passives.
Greater magnitude of priming for adults than for children.

POSSIBILITY 1:
Children have not yet developed the representation of the passive structure and have difficulty in using the structure.

POSSIBILITY 2:
It may reflect stronger prediction error by adults.
A main effect of Trial Order for adults

An additional analysis with Trial Order showed a main effect of Trial Order ($p = 0.007$)

This reflects **cumulative priming**: adult participants were more likely to use the passive structure in later trials in the experiment regardless of the prime condition.
We found an interaction between Full Passive condition and Trial Order ($p = 0.014$).

The magnitude of priming decreased across trials.

The priming effect got smaller for later trials.

This pattern is consistent with error-based implicit learning. (Chang, 2006)
We did **NOT** find an equivalent effects with children ($p > .10$).

Children showed no cumulative priming. ➞ no evidence for learning
Why didn’t children learn?

- We observed **NO** evidence for cumulative priming with children.
- One possibility: The passive structure was simply too difficult for some children.
  - If this is correct, there may be more children who produced only the active structure through the experiment compared to adult participants. This might be the reason for the weaker trial-by-trial priming effect in children.
- We checked this by examining the data pattern for each participant.
  - We conducted additional analyses for children and adults data after excluding those who produced no passive description.
Trial order effects per an adult

1 active prime condition
2 full passive prime condition
3 short passive prime condition
Trial order effects per a child (participant#1-20)

1 active prime condition
2 full passive prime condition
3 short passive prime condition
Trial order effects per a child (participant#21-40)

1 active prime condition
2 full passive prime condition
3 short passive prime condition
We conducted additional analyses for children and adults data after excluding those who produced only the active descriptions. (N = 1 for adults and N = 9 for children).

The results showed the identical pattern of results and the coefficients changed only minimally.

- $\beta = 1.13 \rightarrow \beta = 1.11$ for full passives
- $\beta = 0.95 \rightarrow \beta = 0.93$ for short passives for children
- $\beta = 2.30 \rightarrow \beta = 2.29$ for full passives
- $\beta = 2.34 \rightarrow \beta = 2.32$ for short passives for children.

This suggests that children are in general more reluctant to use the alternative structure.

This may imply that children are less adaptive to given input compared to adults.
Conclusion

1. Both children and adults were more likely to produce full passive descriptions after hearing short passive primes than after hearing active primes.
   - Both children and adults access a common syntactic representation for short passives and full passives.
   - 4,5 and 6 year-old Japanese children can produce full passives.

2. The magnitude of passive priming for adults decreased over the course of experiment.
   - The priming effect for adults was driven by prediction error.
   - But this was not clear for children.
THANK YOU!