Rethinking relative clause processing in Japanese: New evidence with causatives

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Introduction

Two Hypotheses on Filler-gap Dependency
Structural Distance Hypothesis (SDH)
Utilize the number of intervening nodes between a filler and a gap
Linear Distance Hypothesis (LDH)
Utilize the number of intervening constituents between a filler and a gap

Generalization from Typological Point of View
Generalization based on case hierarchy (GCH)
Linear Distance Hypothesis (LDH)

Utilize the number of intervening

Two Hypotheses on Filler-gap Dependency
• SRCs vs. ORCs in Japanese
The reading time of ORCs is reliably longer than that of SRCs (Ishizuka, 2005; Miyamoto & Nakamura, 2003; Ueno & Garnsey, 2007). "These results support SDH.
• A potential confounding factor
The sentence initial accusative NP strongly predict the existence of subject gap. (Ishizuka, 2005; Miyamoto & Nakamura, 2003)

Questions
Is it really the case that processing difficulty is mainly determined by the distance between the gap and the filler as in English?
Experiment 1
What happens if we eliminate the strong-gap prediction?
Experiment 2
What happens if we reverse the NP order?

Materials

Potential confounding factor in using SRCs
GAP insertion
GAP "The girl who saw the old woman off"

Causatives in Japanese
Transitive verb with NP-acc takes NP-acc as a case
"The manager made the secret train due to the chief"
Manager-NOM secretary-DAT employee-ACC train-CAUS-PAST.

Transitive verb with NP-dat takes NP-acc as a case
"The manager made the secret train due to the chief"
Manager-NOM secretary-DAT employee-ACC train-CAUS-PAST.

How to eliminate it?
Avoid using gaps of NP-nom. Use materials with gaps of NP-acc or NP-dat.
Use CAUSATIVE VERBS! Gap insertion will occur at the embedded verb.

Previous Researches on Japanese RC processing
• SRCs vs. ORCs in Japanese
The reading time of ORCs is reliably longer than that of SRCs (Ishizuka, 2005; Miyamoto & Nakamura, 2003; Ueno & Garnsey, 2007). "These results support SDH.
• A potential confounding factor
The sentence initial accusative NP strongly predict the existence of subject gap. (Ishizuka, 2005; Miyamoto & Nakamura, 2003)

Experiments

Experiment 1
What happens if we eliminate the bias with respect to the gap prediction?
Prediction
If SDH is correct, O-RC is read slower than Ni-RC.
If LDH is correct, Ni-RC is read slower than O-RC.
Design
Method: Self-paced reading task
Participants: 23 students
Stimuli: 30 targets × 2 conditions, 42 fillers
Materials: see table 1

Experiment 2
What happens if we reverse the NP order — "NP-acc NP-dat"?
Will the result still support LDH?
Prediction
If LDH is correct, O-RC is read slower than Ni-RC.
If GCH is correct, O-RC is read slower than Ni-RC.
Design
Method: Self-paced reading task
Participants: 33 students
Stimuli: 18 targets × 2 conditions, 42 fillers
Materials: see table 2

Summary
O-RCs were consistently processed easier in Experiments 1 and 2. Generalization based on hierarchy
These results support neither SDH nor LDH. But GCH can capture them.

Conclusion
Neither SDH nor LDH can account for the results of two experiments. These results imply that the processing difficulty of RCs cannot be explained simply by the distance between the filler and its gap site even under the controlled condition.
The results imply that the case markers have a dominant impact on processing RCs in Japanese.

Ni-RC < SLOWER
O-RC

ORCs vs. SRCs
If SDH is correct, O-RC is read slower than Ni-RC.
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ORCs vs. SRCs
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Overall Discussion
GCH revised - from the analysis of cost differences
The input order difference, "NP-nom NP-nom" or "NP-nom NP-dat", might affect the processing difficulty of RCs. If the order "NP-nom NP-nom" causes the strong prediction for a transitive verb while the order "NP-nom NP-dat" does not, discarding such prediction and building another structure will be demanding.

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Participants:
Students in Neuroscience Research Laboratory, Hokkaido University, and Center for Brain Science, University of Tokyo.

Materials:
Stimuli: 18 targets × 2 conditions, 42 fillers
Materials: see table 2

Discussion
Results

Experiment 1
Comprehension accuracy: 83%
Crucial region: Region 4 (the relative head)
Comprehension accuracy:
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