Where Earliness and Shortness Compete: Processing of Fronted Complex-Wh-NPs in Japanese

Kazuma Kimura   Masaya Yoshida

Universitat Autònoma de Barcelona

Introduction

- Under **Active Dependency Formation** (Crain & Fodor 1985; Stowe 1986), parsers are expected to posit a dependency as soon as a grammatically plausible site becomes available.
- In Japanese, a fronted filler can create a competition between two notions of locality: **earliness** (the first licit site encountered in the string) and **shortness** (the structurally closest site).
- Aoshima et al. (2004) reported reanalysis from a matrix attachment to an embedded attachment with fronted wh-dative phrases. We ask whether the same holds for **fronted complex NPs**, where a wh-element and the fronted NP are not identical constituents.

Target

Two Types of Locality": Earliness and Shortness

- **Earliness**: attach the dependency at the first grammatically available position in the linear input.
- **Shortness**: attach the dependency at the structurally closest position to the filler.
- The critical question is which dependency is formed when the two compete inside a single constituent.

(1) a.

```
        XP
       /  \
   Filler  X′
          /  \
        YP   Gap-2
       /
   Gap-1  ...
```
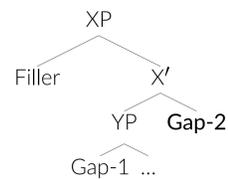
Structural closeness:
Gap-2 is closer to the filler in terms of hierarchical structure.
Filler ↔ **Gap-2**

Linear order:
Gap-1 is closer to the filler in terms of linear information.
→ **Gap-1** → Gap-2

b.   [... Filler ... [... **Gap-1** ...] ... Gap-2 ...]

Predictions and Diagnostic Effects

- **Typing Mismatch Effect (TME)**: if a fronted *dono*-phrase is initially associated with a question dependency, a **declarative** complementizer *to* should create processing cost relative to *ka*.
- **Filled-gap effect**: if the fronted dative NP is first attached to the structurally shortest site and later reanalyzed, a lexical filler in the embedded clause should disrupt this temporary dependency, yielding a cost in the filled-gap condition.
- By comparing {**dono/aru**} NP within the same complex NP, we separate wh-driven dependency formation from fronting of a non-wh NP.

Experimental Design

- A 2 × 2 × 2 factorial deign
- 24 target items and 72 fillers
- Critical region is eight region (an embedded verb + a particle) (00)

(2) a. *Gap + Q-particle*
Gakusei-ga {dono/aru} hon-o okutta kyoju-ni hisyo-wa Shota-no tomodachi-ga toshokan-de t atta **ka** tazunemashita ka
student-NOM which/some book-ACC sent professor-DAT secretary-TOP Shota-GEN friend-NOM library-LOC t met Q asked Q

Did the secretary ask whether Shota's friend met [the professor to whom the student sent which/some book] at the library?
学生が **{どの/ある}** 本を送った教授に、秘書は翔太の友達が図書館で会った**か**どうか尋ねましたか？

b. *Gap + Declarative complementizer*
Gakusei-ga {dono/aru} hon-o okutta kyoju-ni hisyo-wa Shota-no tomodachi-ga toshokan-de t atta **to** tazunemashita ka
student-NOM which/some book-ACC sent professor-DAT secretary-TOP Shota-GEN friend-NOM library-LOC t met COMP asked Q

Did the secretary ask that Shota's friend met [the professor to whom the student sent which/some book] at the library?
学生が **{どの/ある}** 本を送った教授に、秘書は翔太の友達が図書館で会った**と**尋ねましたか？

c. *Filled gap + Q-particle*
Gakusei-ga {dono/aru} hon-o okutta kyoju-ni hisyo-wa Shota-no tomodachi-ga toshokan-de sisyo-ni atta **ka** tazunemashita ka
student-NOM which/some book-ACC sent professor-DAT secretary-TOP Shota-GEN friend-NOM library-LOC librarian-DAT met Q asked Q

Did the secretary ask whether Shota's friend met the librarian at the library [with respect to the professor to whom the student sent which/some book]?
学生が **{どの/ある}** 本を送った教授に、秘書は翔太の友達が図書館で司書に会った**か**どうか尋ねましたか？

d. *Filled gap + Declarative complementizer*
Gakusei-ga {dono/aru} hon-o okutta kyoju-ni hisyo-wa Shota-no tomodachi-ga toshokan-de sisyo-ni atta **to** tazunemashita ka
student-NOM which/some book-ACC sent professor-DAT secretary-TOP Shota-GEN friend-NOM library-LOC librarian-DAT met COMP asked Q

Did the secretary ask that Shota's friend met the librarian at the library [with respect to the professor to whom the student sent which/some book]?
学生が **{どの/ある}** 本を送った教授に、秘書は翔太の友達が図書館で司書に会った**と**尋ねましたか？

Predicted Patterns

If earliness wins	If shortness wins	Key diagnostic
TMEs should appear in non-Q conditions even with complex NP fronting.	Filled-gap costs should emerge in the embedded clause if the parser first posits the shortest dependency.	Earliness predicts a *Wh/Non × Particle* effect; shortness+reanalysis predicts a *Gap × Particle* or filled-gap cost.

Results

- Mixed-effects models revealed a robust **Typing Mismatch Effect**: reading times were significantly longer in the **non-Q / *to*** conditions at the embedded verb+particle region (R8; $p < .003$).
- No reliable **filled-gap effect** was observed in the embedded clause. At the pre-verbal region (R7), there was no significant effect ($p = .38$).
- At the matrix-verb region (R9), the Q/non-Q contrast remained significant ($p < .02$), indicating sustained costs tied to the wh-vs.-non-wh dependency.
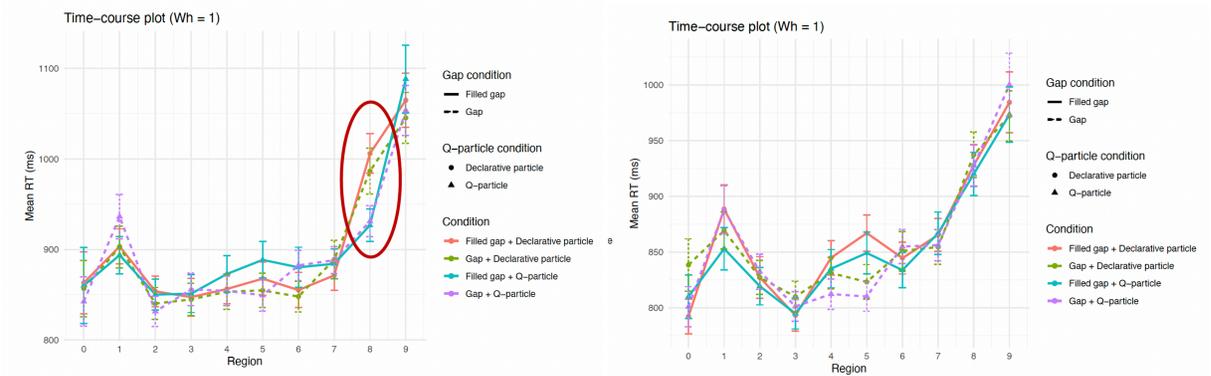

Figure 1. Time-course reading times in the Wh condition. Figure 2. Time-course reading times in the non-Wh condition.

Interpretation

- **Wh-fillers predominantly prefer earliest dependency formation.** The parser is sensitive to the mismatch between a fronted *dono* NP and a non-Q complementizer, even when the fronted constituent is a complex NP.
- **Fronted dative NPs were not reconstructed into the embedded clause by default.** If a shortest-site analysis with subsequent reanalysis were operative here, a filled-gap effect should have appeared, but it did not.
- The present results suggest that the reanalysis reported for wh-dative NPs in Aoshima et al. (2004) is **not the default pattern** for complex wh-fronting.
- More generally, when shortness and earliness compete **within a single constituent**, the parser appears to prioritize forming a dependency **as soon as possible** rather than at the structurally shortest site.

Take-home Message

1. Fronted complex wh-NPs in Japanese trigger a robust TME.
2. No evidence was found for a filled-gap effect in the embedded clause.
3. The data favor **earliness over shortness** in on-line dependency formation.

Possible Follow-up

- Compare **ordinary fronted NPs** and **fronted wh-NPs** directly, rather than using only complex wh-NPs.
- Test whether similar dependency formation is observed in other fronting constructions such as **clausal pied-piping**.

Selected References

[1] Crain & Fodor (1985)   [2] Stowe (1986)   [3] Gibson (1998)   [4] Warren & Gibson (2002) [5] Chacón et al. (2016)   [6] Forster (2009)   [7] Witzel & Witzel (2016) Aoshima et al. (2004)   [9] Takahashi & Miyamoto (2003)   [10] Kamide & Mitchell (1999)