Active Nature of Dependency Formation: The Processing of Tough-constructions

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Active gap filling

a. We like the city that the author wrote unceasingly and with great dedication about ___ while waiting for a contract.

b. We like the book that the author wrote unceasingly and with great dedication about ___ while waiting for a contract.

(Traxler and Pickering 1996)

Introduction
Active gap filling

implausible

a. We like the city that the author wrote unceasingly and with great dedication about ___ while waiting for a contract.

plausible

b. We like the book that the author wrote unceasingly and with great dedication about ___ while waiting for a contract.

(Traxler and Pickering 1996)

Active gap filling

implausible   **slower RT**

a.   We like the city that the author wrote unceasingly and with great dedication about ___ while waiting for a contract.

plausible

b.   We like the book that the author wrote unceasingly and with great dedication about ___ while waiting for a contract.

⟶ *"plausibility mismatch effect"*

(Traxler and Pickering 1996)

Introduction
Tough-constructions

"filler"   *"gap"*

The highway was tough for the trucker to travel ____.

The present study

- Unlike a fronted *wh*-phrase in *wh*-questions or relative clause constructions, the matrix subject in *tough*-constructions does not guarantee the presence of a gap.

- Through a self-paced reading experiment, we investigate whether active gap filling nonetheless takes place in the processing of *tough*-constructions.

Self-paced reading experiment
Methods

- Experiment 1: acceptability ratings (N =55)

- Experiment 2: word-by-word self-paced reading (N = 61)

- 2×2 design:

- Transitivity bias (Transitive-biased vs. Intransitive-biased)

- Plausibility (Plausible vs. Implausible)[1]

	Transitive-biased	Intransitive-biased
Plausible	The article was hard for the editor to read carefully and meticulously about ___ in the office.	The plane was difficult for the pilot to land smoothly and safely behind ___ in the fog.
Implausible	The burglar was hard for the editor to read carefully and meticulously about ___ in the office.	The truck was difficult for the pilot to land smoothly and safely behind ___ in the fog.

[1] We modified Pickering and Traxler's (2003) materials by changing them into *tough*-constructions.

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		Intransitive-biased
Plausible		The plane was difficult for the pilot to land smoothly and safely behind ___ in the fog.
Implausible		The truck was difficult for the pilot to land smoothly and safely behind ___ in the fog.

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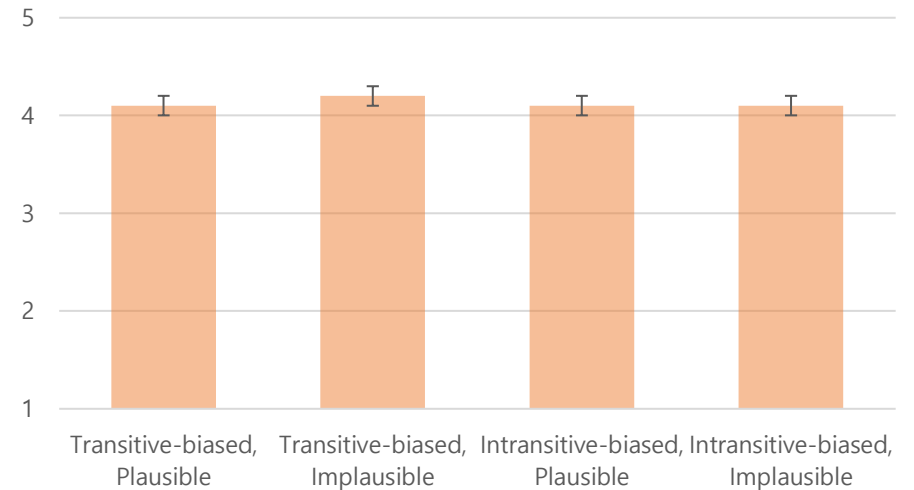|	Transitive-biased	Intransitive-biased
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Self-paced reading experiment
Predictions

> The article/burglar was hard for the editor to <mark>read carefully and</mark> meticulously about ___ in the office.
>
> The plane/truck was difficult for the pilot to <mark>land smoothly and</mark> safely behind ___ in the fog.

- If gap filling takes place only after the location of the actual gap is identified:

	Transitive-biased	Intransitive-biased
RT:	**Plausible = Implausible**	**Plausible = Implausible**

- If the parser actively attempts to postulate a gap, but only when the verb is transitive-biased:

	Transitive-biased	Intransitive-biased
RT:	**Plausible < Implausible**	**Plausible = Implausible**

- If active gap filling is operative irrespective of the transitivity bias of verbs:

	Transitive-biased	Intransitive-biased
RT:	**Plausible < Implausible**	**Plausible < Implausible**

Self-paced reading experiment
Predictions

> The article/burglar was hard for the editor to **read carefully and** meticulously about ___ in the office.
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> The plane/truck was difficult for the pilot to **land smoothly and** safely behind ___ in the fog.

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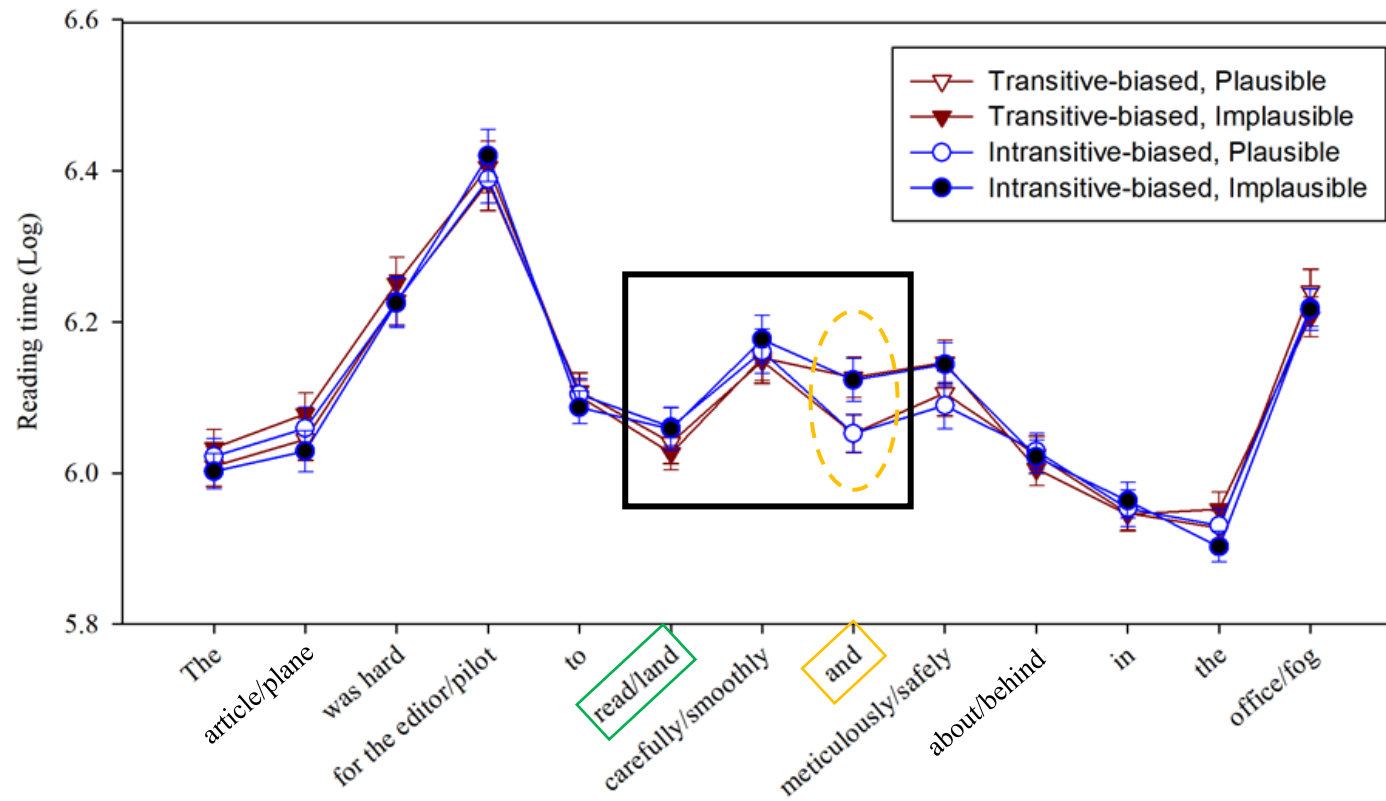|	Transitive-biased	Intransitive-biased
RT:	Plausible < Implausible	Plausible < Implausible

Self-paced reading experiment
Results

Spillover 2 (*and**):

Main effect of Plausibility

Transitive-biased
RT: **Plausible < Implausible**

Intransitive-biased
RT: **Plausible < Implausible**

Self-paced reading experiment
Results

- If gap filling takes place only after the location of the actual gap is identified:

Transitive-biased   Intransitive-biased   ❌

RT: **Plausible = Implausible**   **Plausible = Implausible**

- If the parser actively attempts to postulate a gap, but only when the verb is transitive-biased:

Transitive-biased   Intransitive-biased   ❌

RT: **Plausible < Implausible**   **Plausible = Implausible**

- If active gap filling is operative irrespective of the transitivity bias of verbs:

Transitive-biased   Intransitive-biased   ✅

RT: **Plausible < Implausible**   **Plausible < Implausible**

Discussion

- What triggers active gap filling in the processing of *tough*-constructions?

- Verb (Pickering and Barry 1991)?

- Pre-verbal information (Aoshima et al. 2004, Omaki et al. 2015)?

- What kind of information/requirement triggers active gap filling?

- Syntactic selection?

- Thematic saturation?

Conclusion

- At the verb spillover region:

- a main effect of Plausibility

- no main effect of Transitivity bias

- no interaction between Plausibility and Transitivity

- Our experimental results suggest that:

- Active gap filling is operative in the processing of *tough*-constructions.

- Active gap filling is not affected by the transitivity bias of verbs.

- These findings provide further evidence for the active nature of dependency formation.

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