

Personae in syntactic processing: Socially-specified agents bias expectations of verb transitivity

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Recent work in sociolinguistic perception has demonstrated that a speaker's holistic persona, or social type, shapes how their speech is processed [1]. However, though much work has demonstrated that sentence processing incorporates extra-linguistics factors (e.g. lexical frequency [2], gendered stereotypes [3], world knowledge [4]), less is known about how social constructs affect syntactic structure building. This study explores how persona-based stereotypes influence syntactic ambiguity resolution. In three experiments, we show that personae create bias toward transitive or intransitive VP-structures (Expts 1 and 2) which influence the early stages of sentence comprehension (Expt 3).

24 ambiguously transitive verbs were paired with two personae each. These personae were intended to induce an intransitive interpretation (I-personae) or a transitive interpretation (T-personae). Expt1 confirmed that personae had the intended bias relative to a neutral baseline ("person") using a sentence-fragment completion task ($n=150$). Fragments consisted of a persona-verb pair, with the verb in past-progressive tense, as in (1). Expt 2 used the persona-verb pairs in a naturalness rating task ($n=120$). Each pair was crossed with a manipulation of whether the verb had a direct object (DO) or not, yielding the four conditions in (2). Sentences were rated on a scale from 1 (unnatural) to 7 (natural).

- (1) The $\left\{ \begin{array}{l} \text{hippie} \\ \text{bully} \\ \text{person} \end{array} \right\}$ was tripping ——— (2) The $\left\{ \begin{array}{l} \text{hippie} \\ \text{bully} \end{array} \right\}$ was $\left\{ \begin{array}{l} \text{tripping.} \\ \text{tripping the boy.} \end{array} \right\}$

Figure 1 summarizes the results of Expts 1-2. In Expt 1, T-personae produced more DO completions than I-personae ($p<0.0001$), while neutral person agents fell in between ($p<0.05$). In Expt 2, All four conditions had ratings on the natural half of the scale (ratings 5-7), indicating that incongruent personae-verb pairings were not completely unnatural. This suggests that such pairings do not constitute complete violations of world knowledge. There was also a significant cross-over interaction such that T-personae were rated higher for sentences containing DOs, while I-personae were higher for sentences without DOs. Together, these findings demonstrate that stereotypes surrounding the behaviors of specific personae influence the preferred interpretation of ambiguous verbs.

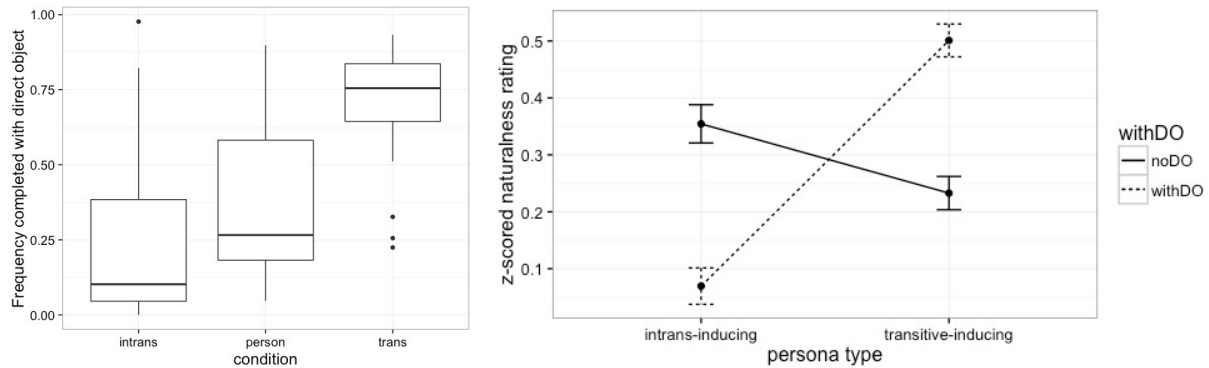
Expt 3 adapted these persona-verb pairs to test whether transitivity bias impacts the early stages of sentence comprehension and recovery from syntactic misanalysis. 24 items patterned on (3) were constructed for an eye-tracking while reading study ($n=55$). Sentences consisted of an adjunct clause containing an ambiguously transitive verb, and either an I-persona, or a T-persona subject. We then manipulated the presence/absence of a post-adjunct comma. When present, the comma forces an intransitive analysis of the adjunct-clause verb. Without a comma, comprehenders may misinterpret the main-clause subject as the DO of the adjunct-clause verb. If so, they should be surprised to encounter the main-clause verb, as indexed by longer reading times [5]. If personae are guiding comprehenders' parsing decisions, we expect that this penalty should be ameliorated when the adjunct-clause subject was intransitively biased.

- (3) While the $\left\{ \begin{array}{l} \text{surfer} \\ \text{craftsman} \end{array} \right\}$ | was tanning(,) | the leather bracelet | on the table | fell | onto the ground.

Figure 2 gives the by-subject means at the main-clause subject and verb regions, with the results of mixed-effects modeling presented in Table 3. We observe three noteworthy findings. First, the main-clause verb was read more slowly (go-past, total time) in the absence of a comma, indicating that readers preferentially adopted a transitive analysis when it was available. Second, when the adjunct-clause subject was transitively biased, first pass and go-past reading of the main-clause was impeded in the presence of a comma, but facilitated in its absence. This suggests that (i) persona bias rapidly impacted comprehenders preferred analysis of the adjunct clause verb; (ii) they nevertheless adopted a transitive analysis given subsequent input. Finally, we see that T-persona subjects inhibited recovery from syntactic misanalysis, as reflected in total reading times of the main-clause subject and verb.

In sum, we show that persona-based expectations influence both off-line, and on-line interpretations of ambiguous verbs. However, our findings suggest that personae provide imperfect cues for on-line comprehension: bottom up structural factors interact with personae to produce complex reading behavior indicative of a role for personae at several stages of comprehension.

Figure 1: Mean by-item proportion direct object completions in Experiment 1, and mean by-subject z-score transformed naturalness ratings in Experiment 2. Error bars represent standard error.



Expt 1

	$\hat{\beta}$	p
Person	1.16	<.05
T-persona	3.29	<.0001

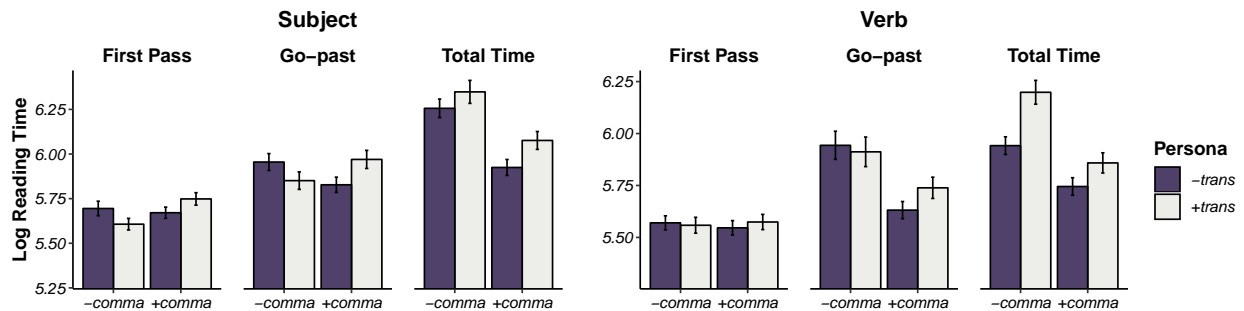
Expt 2

	$\hat{\beta}$	p
DO	-0.346	<.0001
Persona	-0.162	<.05
DO×Persona	0.619	<.0001

Table 1: Results of a mixed-effects logistic model fit to proportion DO responses by experiment condition.

Table 2: Results of a mixed-effects linear model fit to z-transformed naturalness ratings.

Figure 2: By-subject mean first pass, go-past, and total reading times at the main clause subject (“the leather bracelet”) and verb (“fell”) regions in Expt 3. Error bars represent standard error (n=55).



	Subject Region			Verb Region		
	First Pass	Go-Past	Total Time	First Pass	Go-Past	Total Time
Persona	0.25	0.46	2.56	0.38	0.64	4.16
Comma	1.64	0.02	6.22	0.20	3.70	5.59
Persona×Comma	2.00	2.58	0.37	0.26	0.67	1.42

Table 3: T-value results of mixed effects models fit to eye-movement measures in Expt 3.

References

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