Online Processing of, and Adaptation to, Nonbinary Pronouns

Vic Tianlan Wen (twen1@swarthmore.edu), Kirby Conrod, Daniel Grodner, Swarthmore College

Recent years have seen a surge in usage of English nonbinary pronouns associated with increased salience of trans identities [1]. These include definite specific singular *they* with referents of known gender, as well as neopronouns such as *xe, ze, fae,* or *thon*. Acceptability judgment studies have shown their grammaticality to be in transition [2]. For *they*, speakers fall under one of three categories based on their acceptance of *they* [3]: non-innovators, who only license indefinite antecedents (1); innovators, who also allow non-gendered specific antecedents (1-2); and super-innovators, who accept any animate antecedent (1-3).

The present study used a web-based Maze task [4] to investigate processing costs for *they*, *ze*, and *s/he* with definite sg. referents, as well as whether difficulty changes throughout an experiment as participants are exposed to these usages. One possibility is that the novel *ze* will be more difficult than the more common *they* throughout the experiment. Alternatively, *ze* may be more difficult initially than *they* but may actually exhibit more rapid adaptation over the course of the study. Note that *they* is referentially and pragmatically more ambiguous than *ze*. *They* can be used to refer to many different types of antecedents (e.g., plurals, indefinites, generics, institutions). Nonbinary individuals are likely the least common antecedent for *they*. *Ze* is solely and explicitly a nonbinary pronoun. This may facilitate adaptation.

Experiment. 112 participants were trained on the use of either *they* or *ze*, then asked to read sentences about named individuals "who would be referred to with their pronouns." The names were highly associated with one binary gender or equibiased between binary genders, (established via a separate web-based survey). Sentences contained a critical pronoun (binary/nonbinary within participants, *they/ze* between participants) that matched its antecedent's gender features to varying degrees (intermediate/weak). 100 stimuli were developed and divided among four presentation lists using a Latin square design and pseudorandomly interspersed with 25 strongly matched controls (See Table 1).

At each point of a sentence, participants were presented with two words: the correct word, and a length- and frequency-matched foil word that was incompatible with the unfolding sentence. Participants had to select the correct word. RTs and error rates at the pronoun were recorded to assess processing difficulty. Participants were classified as non-innovators, innovators, or superinnovators via an acceptability survey of *they* with various antecedents

Results. Accuracy was at ceiling in each condition (>98%) demonstrating that participants recognized all pronoun types as more grammatical than the foils. RTs were analyzed with maximal mixed effect models. We found a main effect of nonbinary pronoun type where *ze* elicited significantly greater difficulty than *they* ($\beta = -37.2$, $p < 0.01$), likely due to its status as a neologism in a closed class (pronouns). There was also a main effect of presentation order ($\beta = -41.9$, $p < .001$), and an interaction where reaction times decreased over the course of the experiment at a greater rate for *ze* than *they* ($\beta = -36.7$, $p < 0.01$). Non-innovators experienced greater difficulty with nonbinary pronouns than innovators and super-innovators ($\beta = -95.7$, $p < 0.05$). For *ze*, non-innovators also showed more adaptation than innovators and super-innovators ($\beta = 2.0$, $p < 0.001$), and innovators more than superinnovators ($\beta = 1.4$, $p < 0.01$). No effect of match was found for nonbinary pronouns. Thus gender equibiased names did not significantly ameliorate difficulty with nonbinary pronouns.

Discussion. *Ze* was more difficult than *they*, but participants also adapted more quickly to *ze* than *they*. This supports the hypothesis that *ze* is easier to learn because it is less ambiguous than *they*. Another possibility is that learning is error based: The larger the error, the larger the adaptation. However such a mechanism should have led to fast adaptation in the binary weak match conditions, which was not observed. Superinnovators experienced less difficulty with nonbinary pronouns, but also less adaptation than the other clusters. They were previously shown to be younger, more familiar with, and more accepting of trans identities [3]. Their processing fluency may have reached a ceiling early in the study due to prior exposure to, and acceptance of, nonbinary pronouns.

Supplemental Materials

Examples of Sg. *They* usages

(1) *Someone$_i$ slept because they$_i$ were tired.*
(2) *The student$_i$ slept because they$_i$ were tired.*
(3) *Sarah$_i$ slept because they$_i$ were tired.*

Table 1. Example stimuli. Instructions: "This is a story about [name], who uses [pronouns] pronouns."

	Strong match	**Intermediate match**	**Weak match**
Binary pronoun	*Amanda was studying for the bar because she wanted to be a lawyer.*	*Alex bought a new phone because he broke the old one.*	*Alice bought a new phone because he broke the old one.*
Non-binary pronoun	-	*Alex bought a new phone because they/ze broke the old one.*	*Alice bought a new phone because they/ze broke the old one.*

Figure 1: Mean RT by pronoun**Figure 2:** Mean RT by presentation order for *ze* vs *s/he* (left)

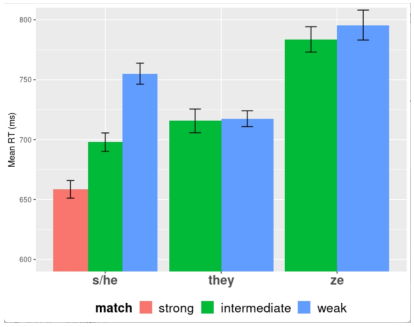

Figure 1: Mean RT by Pronoun Type and Match

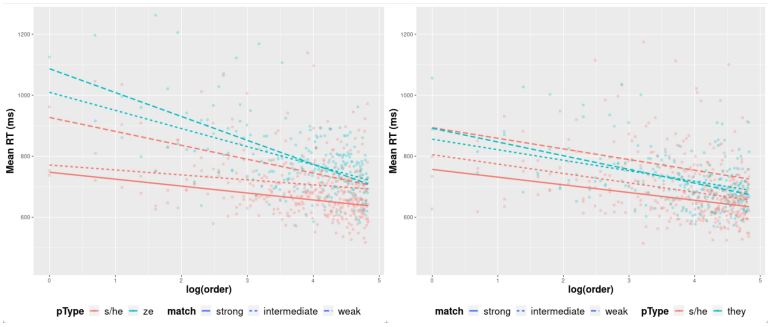

Figure 2: RT by Presentation Order and Match for ze vs. s/he (left) and they vs. s/he (right)

References

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