

The P600 for singular *they*: How the brain reacts when John decides to treat themselves to sushi

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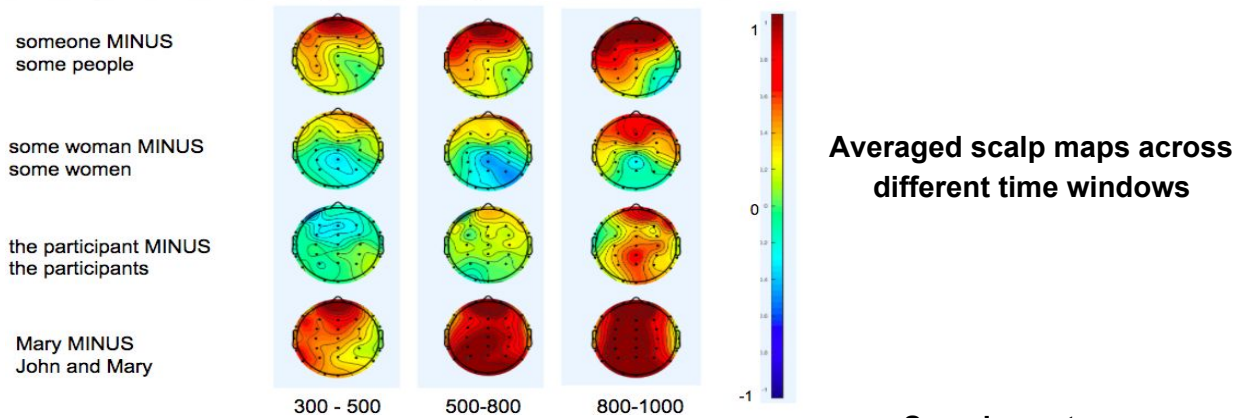
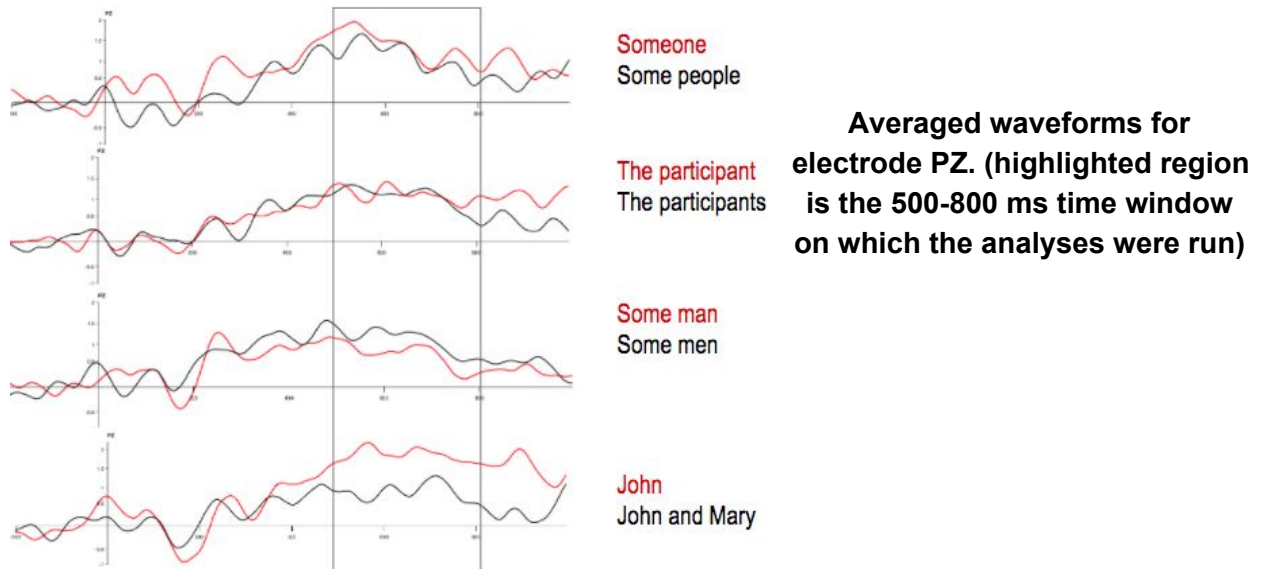
Introduction: The increase in the use of singular ‘they’ as a gender neutral pronoun raises the question of whether this new usage requires any additional processing effort and if yes what causes it. Pronouns that mismatch in features with their antecedents tend to be associated with increased processing effort (Osterhout & Mobley, 1995; Kreiner et al, 2008). Since *themselves* (-singular, 0-feminine) mismatches with *John* (+singular, -feminine) in gender and number, the sentence *John decided to treat themselves to sushi* may be expected to require more effort than the sentence *John and Mary decided to treat themselves to sushi*. Assuming gender and number are the features being matched for pronoun agreement in English, logically there are three possible feature mismatches that might drive the predicted increase in processing effort (if any): 1) Number mismatch only—this predicts that we should find equivalent increase in processing effort for all singular antecedents. 2) Gender mismatch only—this predicts that we should find an increase in processing effort for antecedents marked for gender (ex. *John* or *some man*) but not for antecedents unmarked for gender (ex. *someone* or *the participant*). 3) A combination of gender and number mismatch—this predicts that while we expect to find an increase in processing effort for all singular antecedents, singular antecedents that also have a gender mismatch (*John* or *some man*) should have a greater increase

Methods: We compared the P600 amplitude for ‘themselves’ for the following four different kinds of singular antecedents with their plural counterparts: specific unambiguous gender (*John* vs *John and Mary*), specific ambiguous gender (*the participant* vs *the participants*), generic unambiguous gender (*some man* vs *some men*) and generic ambiguous gender (*someone* vs *some people*). We auditorily presented 50 sentence pairs for each kind of antecedent. Though specific antecedents like *the participant* are unmarked for gender, it is possible that people visualize a specific person and assign either +feminine or -feminine instead of 0-feminine. In order to minimize this possibility we tested participants living in an environment where it was disadvantageous to make apriori gender assumptions because of the presence of many transgender individuals or individuals who identify as having a non-binary gender identity. These participants either identified as having a non-binary gender identity (n=20) or as being either male or female (n=22). We found no differences between these groups.

Results: We found a significant Specificity X Ambiguity interaction effect ($p < 0.05$). This interaction was driven by the fact that antecedents with ambiguous or unmarked gender (*the participant/someone*) did not elicit a P600, but specific unambiguous antecedents (*John*) did. Unexpectedly, generic unambiguous antecedents (*some man*) elicited a negativity in the same time window. Since we failed to find a P600 for unmarked singular antecedents, the results seem to be most consistent with the account 2 - i.e. the increased processing effort for singular ‘themselves’ (greater P600) is largely due to a gender mismatch and not a number mismatch. These results suggest that if we are able to construe singular antecedents as being unmarked for gender, then there is no processing cost in using ‘themselves’ to refer to singular antecedents (despite the fact that ‘themselves’ is overtly marked as being plural).

References: Lee Osterhout and Linda A Mobley. Event-related brain potentials elicited by failure to agree. *Journal of Memory and language*, 34(6):739, 1995.

Kreiner, H., Sturt, P., & Garrod, S. (2008). Processing definitional and stereotypical gender in reference resolution: Evidence from eye-movements. *Journal of Memory and Language*, 58(2), 239-261.



Sample sentences

Antecedent	Singular	Plural
Generic ambiguous	Someone in this group needs to pull themselves together	Some people in this group need to pull themselves together
Generic unambiguous	Every woman must learn to stand up for themselves	All women must learn to stand up for themselves
Specific ambiguous	The stranger poured themselves a cup of coffee	The strangers poured themselves a cup of coffee
Specific unambiguous	John decided to treat themselves to some sushi	John and Mary decided to treat themselves to some sushi