Brain potentials and individual differences in processing stereotypical and semantic gender information

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Stereotypical gender information about the sex of characters in a sentence is immediately included into a mental model of the text (e.g., [1,2,3]). This topic has been largely investigated in psycholinguistics using behavioural techniques [1,3]. However, when and how this process is carried out in the brain has rarely been investigated using Event Related Potentials (ERPs) [4], which permit the investigation of covert responses with high temporal resolution. The present study consists of a replication and extension of Osterhout et al. (1997): we tested participants while they were reading reflexive pronouns in English that referred to previously introduced role nouns, embedded in short sentences. Two experimental factors were manipulated: pronouns could either agree with the gender information provided by their antecedents or not and the gender information was either conveyed by the role name's semantics (see 1 and 2) or by its associated stereotypical representation (see 3 and 4).

Research showed that the gender feature of typically male or female role nouns hinges on people's world-knowledge [e.g., 5] and influences their processing [4]. Individuals' beliefs about men and women might predict how this information is processed: more "sexist" participants could have more stereotyped representations and thus encode stereotypical information leading to larger mismatch effects. To test this novel hypothesis four additional measures assessing participants' a) implicit associations between gender and career (IAT, [6]), b) self-perceived sex role (BSRI, [7]), and c) societal views on sexism (ASI [8] and MS [9]), were collected. Given that implicit and explicit measures assess different constructs [10] we selected a wide range of possible predictors of the amplitude of the ERP effects, hypothesizing that implicit measures (the IAT) would be better predictors for covert ERP effects than explicit questionnaires.

Consistent with Osterhout and colleagues (1997), we found an interaction between noun type and agreement on the amplitude of the P600 component (500-700 ms). However, the P600 is larger for pronouns mismatching the gender of semantically defined nouns only, whereas processing stereotypical gender incongruent pronouns elicited a left anterior negativity (300-700). The stereotypical mismatch effect on the P600 component, which was not significant in the ERP grand averages, correlated with the most explicit measure of sexism, the ASI [r(28)=0.49], whereas the LAN effect in the stereotype condition was reduced in participants who described themselves as more typically female on the BSRI [r(28)=0.43]. The P600 has been associated with syntactic anomalies. Although this association is contested today [11] the P600 effect suggests that the incongruence between stereotypical gender information and the explicit gender feature provided by pronouns requires syntactic repair [12,13] only when participants show stronger sexist beliefs.

This study once more highlights the impact of stereotypical assumptions on online sentence processing. Individual differences in gender-related beliefs modulate the consequences of processing incongruent information, making individuals more or less capable of recovering from sentence disruption.

Sentences Experiment 1

(1) The mother talked to <u>herself</u> during the blackout.
(2)* The mother talked to <u>himself</u> during the blackout.
(3) The mechanic talked to <u>himself</u> during the blackout.
(4) The mechanic talked to <u>herself</u> during the blackout.

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