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Research report

Detecting gender before you know it: How implementation intentions control early gender categorization

Sabine Hügelschäfer [a,*], Alexander Jaudas [b], Anja Achtziger [b]

[a] Department of Economics, University of Cologne, Albertus-Magnus-Platz, D-50923 Köln, Germany
[b] Department of Political and Social Sciences, Zeppelin University, Am Seemooser Horn 20, D-88045 Friedrichshafen, Germany

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ABSTRACT

Gender categorization is highly automatic. Studies measuring ERPs during the presentation of male and female faces in a categorization task showed that this categorization is extremely quick (around 130 ms, indicated by the N170). We tested whether this automatic process can be controlled by goal intentions and implementation intentions. First, we replicated the N170 modulation on gender-incongruent faces as reported in previous research. This effect was only observed in a task in which faces had to be categorized according to gender, but not in a task that required responding to a visual feature added to the face stimuli (the color of a dot) while gender was irrelevant. Second, it turned out that the N170 modulation on gender-incongruent faces was altered if a goal intention was set that aimed at controlling a gender bias. We interpret this finding as an indicator of nonconscious goal pursuit. The N170 modulation was completely absent when this goal intention was furnished with an implementation intention. In contrast, intentions did not alter brain activity at a later time window (P300), which is associated with more complex and rather conscious processes. In line with previous research, the P300 was modulated by gender incongruency even if individuals were strongly involved in another task, demonstrating the automaticity of gender detection. We interpret our findings as evidence that automatic gender categorization that occurs at a very early processing stage can be effectively controlled by intentions.

1. Introduction

1.1. Automatic gender categorization and its control

There has been an increasing debate about the automaticity of social categorization over the last 30 years (Brewer, 1988; Devine, 1989; Fiske and Neuberg, 1990). The controllability of automatic social category activation is at the core of this debate. Some authors argue that social categorization along basic dimensions like gender and race is an unconditional process that inevitably occurs when the perceiver registers a social stimulus like a face (Devine, 1989). Other authors have cast doubts over this interpretation by proposing that the automatic categorization of social stimuli is not necessarily mandatory, but might be blocked by contextual factors. For instance, according to Gilbert and Hixon (1991), ethnic categorization requires the availability of cognitive resources. This was confirmed for gender categorization in studies by He and Chen (2010) and Murray et al. (2011). Similarly, Macrae et al. (1997) argued that individuals with a non-semantic processing goal (e.g., a visual detection goal) do not process the semantic features of the presented person; therefore, they do not categorize this individual according to gender (see also Wheeler and Fiske (2005)). In the same way, Wiese et al. (2008) concluded from their own results that the activation of gender categories is task-dependent.

However, Ito and Urland (2003, 2005) and Tomelleri and Castelli (2012) found some evidence of automatic race and gender categorization, irrespective of whether participants attended to these dimensions (see also Mouchetant-Rostaing et al. (2000)). For instance, in the study by Tomelleri and Castelli (2012), gender categorization occurred both when participants were explicitly asked to categorize faces according to their gender but also when the stimuli had to be categorized according to the presence of a dot on the face (i.e., when gender was irrelevant for the task). This gender categorization effect could be detected by means of event-related potentials (ERPs) at both an early (N170) and a later processing stage (P300). Gender categorization effects were only absent when gender was task-irrelevant and face processing was very resource-consuming, and only at later time windows (P300). These results constitute further evidence that gender categorization seems to be a largely automatic process that is not easily controlled.

* Corresponding author.
E-mail addresses: sabine.huegelschaefer@uni-koeln.de (S. Hügelschäfer), alexander.jaudas@zu.de (A. Jaudas), anja.achtziger@zu.de (A. Achtziger).

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This automaticity might represent a serious problem in everyday life, as gender categorization leads to stereotype activation, which in turn leads to distorted perceptions and discrimination at the behavioral level. To be more specific, it has been shown that the mere categorization of an individual as belonging to a particular group can lead to the activation, i.e. heightened cognitive accessibility of group-specific stereotypical attributes (Bodenhausen and Macrae, 1998; Stangor, 1996, 2000). Once stereotypes have been activated, they are usually (although not necessarily) also applied. That is, they bias evaluations and behavior in stereotype-consistent ways (see Wheeler and Petty (2001)). For instance, Devine (1989) observed that when the stereotype of African Americans had been activated through a priming manipulation, the actions of a person belonging to this group were evaluated as more hostile. The link between stereotypes and discrimination has been confirmed in a large number of studies. For example, Amodio and Devine (2006) found a direct relation between participants' automatic stereotypes towards African Americans (measured by means of the implicit association test; Greenwald et al., 1998) and negative expectations about the academic performance of an African American student with whom they interacted. Agerström and Rooth (2011) observed that implicit stereotypes towards obese people predicted hiring managers' discrimination against obese job applicants in real hiring decisions. Heilman (2001) argues that discrimination in the workplace results from a mismatch between a stereotype (e.g., women are kind, sensitive, empathic) and a certain work role (e.g., managers have to be achievement-oriented, aggressive, tough), which implies that even stereotypes with a positive connotation can lead to detrimental biases against a group.

Accordingly, over the last three decades social cognition research has spent a lot of effort into the investigation of strategies to control automatic stereotype activation (e.g., Wheeler and Fiske, 2005) as it seems to be the very first step to discriminative behavior. The present study followed this line of research by examining the neural aspects of automatic gender activation and its inhibition. Hence, compared to earlier studies we focus on the control of social categorization, which is assumed to be the first step in stereotyping and is primarily based on gender, age, and race. This was done to explore whether automatic gender categorization could be inhibited in a very early time window, so that stereotype activation would be prevented at the outset.

Plenty of research on self-regulation has shown that even highly automatic information processes can be controlled by implementation intentions (if-then plans that link a goal-directed response to a specific situation; Gollwitzer, 1999). Prior research has demonstrated that forming an implementation intention leads to quick, immediate, and efficient action initiation (Brandstätter et al., 2001; Gollwitzer and Brandstätter, 1997) that does not require conscious intent (Bayer et al., 2009; Lengfelder and Gollwitzer, 2001). Following this line of research, the present study explored whether automatic gender categorization as indicated by modulations of early event-related potentials (ERPs) could be controlled by means of goal intentions and implementation intentions. In accordance with experiments on neural aspects of gender categorization (Ito and Urland, 2003, 2005; Tomelleri and Castelli, 2012; Wiese et al., 2008), we recorded electrocortical activity by means of the EEG in a gender categorization task (semantic task) and in a visual search task (non-semantic task). In both tasks the same stimulus material was presented (photos of male and female faces). We explored 1) whether electrocortical activity (i.e., ERPs) indicated automatic gender categorization in these tasks, and 2) whether that categorization could be controlled by the use of goal intentions and implementation intentions.

1.2. Goal intentions and implementation intentions

Goals are mental representations of desired end states which have the format "I want to attain X!" (Gollwitzer, 1993, 1999). People often fail to reach their goals due to problems with action initiation and goal striving. Implementation intentions have been shown to be more effective in supporting goal striving and shielding than mere goal intentions (Achtziger et al., 2008; Gollwitzer and Sheeran, 2006). Implementation intentions specify when, where, and how goal-directed behavior should be initiated by defining a specific situation or inner state (see Achtziger et al. (2008)) and linking these cues to goal-directed behavior (Gollwitzer, 1999). Accordingly, implementation intentions have the format "If cue X occurs, then I will do Y!" The link between a cue and a goal-directed behavior leads to a heightened cognitive activation of the cue, resulting in its strongly increased accessibility (Achtziger et al., 2012). Moreover, by linking a cue to goal-directed behavior, action control becomes automatized – meaning that as soon as the specified cue is encountered, the previously specified goal-directed behavior is elicited automatically. Thus, goal striving by implementation intentions is immediate, efficient, quick, and does not require conscious intent (e.g., Bayer et al., 2009; Brandstätter et al., 2001). Due to their ability to instigate automatic processes, implementation intentions are able to control automatic phenomena (Bayer et al., 2009; Brandstätter et al., 2001). Especially in the field of stereotype control, there are some studies that demonstrated the control of stereotype activation and application by implementation intentions. For instance, Mendoza et al. (2010) provided evidence for the inhibition of race stereotypes in the Shooter Task (Correll et al., 2002) by means of if-then plans. Similarly, Stewart and Payne (2008) proved that counter-stereotypical implementation intentions reduce automatic stereotyping effects in the Weapons Identification Task (Payne, 2001). Note that these studies did not measure neural correlates of stereotype activation and inhibition. A study by Paul et al. (2007) was one of the first experiments that investigated neural correlates of the enacting on implementation intentions. These authors observed a stronger modulation of the P300 in a Go/No-Go task associated with enactment on implementation intentions in a sample of children with an ADHD diagnosis compared to control children. Schweiger Gallo et al. (2009) found an altered P1 component in response to fear-inducing stimuli in participants who had formed an implementation intention to ignore those stimuli. Hence, there are some first results demonstrating that the effects of implementation intentions can be detected in ERPs of electrocortical activity (for further neuronal correlates of implementation-intention effects, see the comprehensive review by Wieber et al. (2015)). However, to the best of our knowledge, this has not been shown in the context of stereotypes and social stereotyping.

1.3. The present research

We tested the effects of goal intentions and implementation intentions (Gollwitzer, 1999) on neural indicators of automatic gender categorization by analyzing the N170 and the P300 in response to the presentation of female and male faces (see Ito and Urland (2003, 2005) and Tomelleri and Castelli (2012)). The N170 (at occipital sites) was analyzed because it is an early component associated with the structural encoding of faces (e.g., Bentin et al., 1996). It is assumed to reflect a neural mechanism that is specific for face processing, as it is usually absent or considerably smaller for non-face stimuli (Itier and Taylor, 2004). Several studies have shown that this component reflects high-level processing of facial properties in contrast to low-level processing of merely perceptual features (Macrae and Quadflieg, 2010; Rossion and Jacques, 2008; Sagiv and Bentin, 2001). Similarly, the N170 is modulated by