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Research Report

Influence of encoding focus and stereotypes on source monitoring event-related-potentials

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ABSTRACT

Source memory, memory for the origin of a memory, can be influenced by stereotypes and the information of focus during encoding processes. Participants studied words from two different speakers (male or female) using self-focus or other-focus encoding. Source judgments for the speaker's voice and Event-Related Potentials (ERPs) were recorded during test. Self-focus encoding increased dependence on stereotype information and the Late Posterior Negativity (LPN). The results link the LPN with an increase in systematic decision processes such as consulting prior knowledge to support an episodic memory judgment. In addition, other-focus encoding increased conditional source judgments and resulted in weaker old/new recognition relative to the self-focus encoding. The putative correlate of recollection (LPC) was absent during this condition and this was taken as evidence that recollection of partial information supported source judgments. Collectively, the results suggest that other-focus encoding changes source monitoring processing by altering the weight of specific memory features.

1. Introduction

The ability to identify the origin of a memory, or source memory, is a critical cognitive process that affects our daily life experiences. For example, remembering which website had the viral video is important so that you can share it with your contacts. Source monitoring is typically studied in the laboratory by presenting participants with items from various sources (e.g., word lists presented by two different speakers) and subsequently asking them to identify which speaker presented the word or identify if the word was new. Therefore, the memory task demands that participants attribute studied items to the original source.

The Source Monitoring Framework describes the cognitive processing that is used to make source judgments (Johnson et al., 1993). Source monitoring capitalizes on the qualitative characteristics of an experience that are bound, stored, and reactivated. Monitoring tends to be relatively heuristic in that it is more automatic. For example, memories with lots of visual detail characterize seen events more than heard events. Other judgments can utilize more systematic monitoring which is more deliberate, slower, and can use knowledge acquired before the formation of the episodic memory to differentially weight targeted characteristics and/or infer the likely source of the memory. For example, if the funny video website has been forgotten, then schematic information,

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such as the characteristics of the video or the website, can help identify the source.

Prior knowledge is particularly helpful for systematic source monitoring when the qualitative characteristics bound in memory are not particularly diagnostic of source. Such contexts have been created in the laboratory by using sources that are consistent with schema, such as political party affiliation (Mather et al., 1999), professional affiliation (Bayen et al., 2000; Dodson et al., 2008; Hicks and Cockman, 2003; Mather et al., 1999; Sherman and Bessenoff, 1999), and personal characteristics such as gender (Leynes et al., 2013) and sexual orientation (Marsh et al., 2006). In these contexts, source decisions are influenced by different types of categorical knowledge that can be used to infer source for each item.

Schematic information is more useful when source-specifying information is lacking (Johnson et al., 1993). One factor that can reduce the amount of details in memory is the emotional focus during initial encoding (Johnson et al., 1996; Mather et al., 1999). In these studies, participants focused on their own emotional intensity (self-focus) or on the person making a series of statements (other-focus). Other-focus consistently increased source monitoring accuracy and decreased recognition (i.e., item recognition) as compared with self-focus encoding. This important dissociation between recognition and source is unique because the more typical pattern is for a factor (e.g., shallow encoding) to lead to worse source memory than recognition. Mather et al. also found that self-focus led to a greater reliance on stereotypes to support source decisions. The purpose of the present study was to investigate the effect of encoding focus on source monitoring using a valuable neuroimaging technique (event-related potentials or ERPs) that provides moment to moment changes in brain activity elicited by a stimulus.

1.1. *ERPs and source monitoring*

ERPs are used to study the cognitive processes during source monitoring because studied items and unstudied items produce "old/new" differences in ERP amplitudes. Memory-related ERP components are distinguished by temporal onset (i.e., time after the test probe) and spatial location (i.e., electrodes where the effect is present or maximal).

Old items produce more positive ERP amplitudes 300–500 ms at mid-frontal electrode sites (i.e., FN400) when the judgment is familiarity-based, whereas old/new differences emerge approximately 500–800 ms at left parietal electrode sites (often called the "parietal old/new effect" or Late Positive Component, LPC) when the judgment is recollection-based (e.g., Rugg and Curran, 2007, but see Voss et al., 2012 for an alternate view). The LPC has been linked with activation in left inferior parietal cortex (Vilberg and Rugg, 2009) that supports recollection when task-relevant details are activated (Leynes, 2012). Because identifying source draws more heavily on recollection and very little on familiarity in most cases (for exceptions see Diana et al., 2011, 2008), the LPC is frequently observed during source monitoring while the FN400 is rarely observed during source monitoring tasks.

Source memory studies also report a third old/new ERP difference that has a later onset (approximately 800 ms after the probe) and typically has a right-frontal distribution. Based on many ERP findings, the "right frontal effect" (RFE hereafter) has been hypothesized to reflect post-retrieval processes (e.g., Mecklinger, 2000; Wilding and Rugg, 1997) or more general monitoring processes (e.g. Hayama et al., 2008; Leynes, 2012; Leynes and Kakadia, 2013) that are comparable to heuristic decision processes that are described by the SMF (Leynes and Phillips, 2008).

Some source memory studies also report another ERP component, called the "late posterior negativity" (LPN hereafter), that is characterized by a late onset (approximately 1000 ms) and more negative ERP amplitudes for old sources relative to new with maximal differences at posterior electrode sites (see Johansson and Mecklinger, 2003 for a review; Friedman et al., 2005; Herron, 2007; Leynes, 2012; Leynes et al., 2006; Leynes and Phillips, 2008). The available evidence suggests that it reflects additional inspection of retrieved feature conjunctions that can support difficult source discriminations (Johansson and Mecklinger, 2003; Mecklinger et al., 2007), which is similar to systematic monitoring as described by the SMF (Leynes and Phillips, 2008).

1.2. *Study purpose*

Leynes et al. (2013) used ERPs to measure source monitoring when gender stereotypes could and could not be consulted to support the source judgment. Participants heard words spoken in a male or female voice and, at test, were asked to identify the speaker. During the stereotype-consistent condition, the male voice always said stereotypically masculine words and the female voice said stereotypically feminine words. At test, participants could use their gender word knowledge, which was acquired prior to the experiment, as a clue to identify the likely speaker. This was not possible in the other condition (stereotype inconsistent) because both the male and female voices said a mix of masculine and feminine words. Importantly, source accuracy was greater and response times were faster in the stereotype-consistent condition, whereas recognition measures were equivalent between conditions. This served as important evidence that stereotypes were consulted to infer the likely source of the speaker when stereotypes provided source diagnostic information (i.e., stereotype-consistent condition). The ERP differences during the stereotype-inconsistent condition matched prior source memory studies because old items (collapsing across male and female voices) elicited the LPC, RFE and LPN. The RFE was not observed during the stereotype-consistent condition; instead, the LPN emerged earlier and was more frontally distributed. The authors suggested that this altered LPN pattern reflected activation of gender stereotypes to aid the source judgment.

Although these results are an important first step toward understanding how stereotypes may be used to aid source memory judgments, the purpose of the present study was to provide a more rigorous test of this relationship. One criticism of Leynes et al. (2013) comparison is that stereotype use was present in one condition and not present in the other condition leaving open the possibility that the ERPs also capture more general differences in task demands (e.g., difficulty, available cues, etc.) that co-varied with stereotype availability. The present study was designed to address this limitation by making stereotype information accessible in