

available at www.sciencedirect.comwww.elsevier.com/locate/brainres**BRAIN
RESEARCH****Research Report****Hemispheric asymmetries in font-specific and abstractive priming of written personal names: Evidence from event-related brain potentials[☆]**Stefan R. Schweinberger^{a,b,*}, Amy Lisa Ramsay^b, Jürgen M. Kaufmann^{a,b}^aDepartment of General Psychology, Friedrich-Schiller University Jena, Am Steiger 3/Haus 1, 07743 Jena, Germany^bDepartment of Psychology, University of Glasgow, UK

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ABSTRACT

We assessed hemispheric differences in font-specific and abstractive repetition priming for famous persons' names. Participants performed speeded familiarity judgments for foveally presented famous and unfamiliar names. Famous target names were preceded by primes (150 ms) in the left or right visual field (LVF or RVF). Primes were either the same name as the target written in the same font (font-specific priming), the same name in a different font (abstractive priming), or a different name (unprimed condition). In reaction times, LH superiority was strong for abstractive priming across fonts, but was reduced to insignificance for font-specific priming. We observed 3 different ERP modulations of priming for target names: a small font-specific posterior N200 (160–220 ms), a left temporal N250r (220–300 ms), and an N400 modulation (300–500 ms). The left temporal N250r exhibited large and abstractive priming for RVF primes, but smaller and font-specific priming for LVF primes. N400 effects were observed in all priming conditions. With respect to previous findings that N200, N250r, and N400 reflect facilitation at the levels of font-specific encoding, lexical entries for names, and semantic processing, respectively, these findings suggest that the LH superiority for name processing is particularly pronounced for the access to abstractive lexical entries for written names, a process that may be mediated by the left fusiform cortex.

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1. Introduction

Priming is a facilitation in processing stimuli that is induced by prior exposure to an identical or highly related stimulus. Priming paradigms have been used for some time to explore cognitive operations engaged during the processing of commonly encountered stimuli such as words (Morton, 1969,

1979), pictures of objects (Schacter et al., 1990), faces (Bruce and Valentine, 1985), and personal names (Calder and Young, 1996; Young et al., 1988; Pickering and Schweinberger, 2003).

While processing is typically enhanced for repeated items, priming may facilitate processing at various levels, and responses to primed stimuli are mediated by a range of factors (Tenpenny, 1995). Moreover, immediate repetition priming

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(when prime and target are only separated by a small time interval in the absence of intervening stimuli) may be mediated by multiple mechanisms including facilitation at the level of featural, lexical/memorial, and semantic levels of processing. Supporting this idea, some studies have shown equivalent priming for words across large manipulations in visual form (Clarke and Morton, 1983; Feustel et al., 1983; Morton, 1979). Other studies report compelling evidence for additional, perceptually specific word priming effects, as reflected in reduced priming when prime and target words were presented in a different case or a different font (e.g., Burgund and Marsolek, 1997; Jacoby and Hayman, 1987; Marsolek et al., 1992). This research has also suggested differences between the two hemispheres with respect to their mode of processing, suggesting that whereas the left hemisphere stores stimuli in a more abstractive, image-independent manner, the right hemisphere stores stimuli in a more image-dependent manner (Marsolek et al., 1992; Marsolek, 1995, 1999). It has also been suggested that a font-independent left hemisphere priming of written words might be related to the left fusiform gyrus region, in which other researchers have identified the so-called “visual word form area” (McCandliss et al., 2003).

Personal names are a specific class of words the retrieval and recognition of which are important for human social functioning. However, failures in name retrieval are relatively common (Young et al., 1985), and the question why names are particularly difficult to recall when compared with other words, or when compared with semantic information about people, has concerned cognitive scientists for a long time (Abdel Rahman et al., 2002, 2004; Burke et al., 2004; Burton and Bruce, 1992; Huddy et al., 2003). Personal names can exhibit selective sparing and deficits after brain injury, suggesting perhaps that their neural representation differs from that of other words (Semenza et al., 1995). Some authors have claimed that personal name recognition is mediated predominantly by the right hemisphere (Van Lancker, 1991; Van Lancker et al., 1991). However, this hypothesis has remained controversial (Schweinberger et al., 2002a). Functional brain imaging has revealed strong involvement of left, but not right, temporal lobe areas in the recognition of personal names (Grabowski et al., 2001), and event-related brain potentials (ERPs) also suggest a stronger involvement of the left hemisphere in name recognition (Proverbio et al., 2001).

In the present paper, we used ERPs in order to further explore hemispheric asymmetries in repetition priming of written names. ERPs provide a millisecond-by-millisecond window to the neural processes that are modulated by priming and therefore have been widely used to chronometrically delineate processing stages involved in priming and recognition (Bentin and McCarthy, 1994; Tsivilis et al., 2001; Dehaene et al., 2001; Rugg et al., 1995; Paller and Gross, 1998). The N400 is probably the best-known ERP that is sensitive to priming. This is a negative component maximal at central-parietal locations around 400 ms after stimulus onset (Kutas and Hillyard, 1980). The N400 typically reflects semantic processing, and N400 amplitude appears to be a function of the difficulty with which an item can be integrated with its semantic context. The N400 may also reflect automatic spreading of activation within semantic networks (Kiefer,

2002). In a recent paper that is of direct relevance for the current study, we assessed immediate repetition effects on event-related potentials (ERPs) while participants performed familiarity decisions to written personal names (Pickering and Schweinberger, 2003). For immediately repeated familiar names, we observed three distinct ERP modulations. At 180–220 ms, a posterior N200 effect occurred for names preceded by same-font primes only. In addition, an increased left temporal negativity (N250r, 220–300 ms, *r* referring to the repetition effect) and a reduced central-parietal negativity (N400, 300–400 ms) were seen both for same-font and different-font repetitions. In a second experiment, when names were preceded by either their corresponding face or the face of a different celebrity, only the N400 effect was preserved, indicating that N200 and N250r depend on the repetition of various aspects of featural and perceptual word form information, but were not elicited by the repetition of semantic information *per se*. These findings suggest that the N200, N250r, and N400 effects reflect facilitated processing at font-specific featural, lexical, and semantic levels of processing, respectively. Intriguingly, source analysis of the font-independent N250r priming effect pointed to a fusiform generator with a left hemisphere preponderance (Pickering and Schweinberger, 2003). This might indicate that the left-lateralized N250r to repeated names may originate from areas at or close to the visual word form area (VWFA) as identified by McCandliss et al. (2003).

In other studies using pictorial stimuli, the immediate repetition of faces has been demonstrated to elicit a considerably larger N250r response—a response that is typically lateralized to the right hemisphere (Schweinberger et al., 1995). This right-lateralized N250r was larger for repetitions of faces when compared to a number of control stimuli (Schweinberger et al., 2004) and was thought to be generated by the fusiform gyrus (Schweinberger et al., 2002b).

One of the limitations of the ERP studies mentioned above is that they used foveal presentation of primes and targets. A more direct way to investigate functional hemispheric asymmetries is to present stimuli tachistoscopically to either the left visual field/right hemisphere (LVF/RH) or to the right visual field/left hemisphere (RVF/LH). In the present study, we investigated RTs and ERPs while participants performed speeded familiarity judgments for centrally presented target names that were preceded by primes briefly presented to the LVF/RH or the RVF/LH. We reasoned that if the left hemisphere has a predominant role in representing personal names, then larger priming should be observed for target names preceded by primes presented to the RVF/LH, as compared to target names preceded by primes presented to the LVF/RH. In ERPs, we expected to observe N200, N250r, and N400 priming effects similar to those described earlier for foveal priming (Pickering and Schweinberger, 2003). For the priming conditions, we also investigated whether repetition priming effects would still be seen when the word font is changed between prime and target. We predicted that, to the extent that personal names are mediated by an abstractive, font-independent representation system in the left hemisphere (fusiform), both same-font and different-font priming should be seen for targets following RVF/LH primes. By contrast, to the extent that a font-specific representation system in the RH contributes to name priming,

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