Boundary conditions for the influence of unfamiliar non-target primes in unconscious evaluative priming: The moderating role of attentional task sets ☆

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A B S T R A C T

Evaluative priming by masked emotional stimuli that are not consciously perceived has been taken as evidence that affective stimulus evaluation can also occur unconsciously. However, as masked priming effects were small and frequently observed only for familiar primes that there also presented as visible targets in an evaluative decision task, priming was thought to reflect primarily response activation based on acquired S–R associations and not evaluative semantic stimulus analysis. The present study therefore assessed across three experiments boundary conditions for the emergence of masked evaluative priming effects with unfamiliar primes in an evaluative decision task and investigated the role of the frequency of target repetition on priming with pictorial and verbal stimuli. While familiar primes elicited robust priming effects in all conditions, priming effects by unfamiliar primes were reliably obtained for low repetition (pictures) or unrepeated targets (words), but not for targets repeated at a high frequency. This suggests that unfamiliar masked stimuli only elicit evaluative priming effects when the task set associated with the visible target involves evaluative semantic analysis and is not based on S–R triggered responding as for high repetition targets. The present results therefore converge with the growing body of evidence demonstrating attentional control influences on unconscious processing.

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1. Introduction

For several decades, automatic emotional evaluations have been investigated with the evaluative priming paradigm. In evaluative priming, primes and targets (words or pictures) either share the same emotional valence (e.g., both positive: baby – rabbit) in the congruent condition or exhibit a different valence (e.g., positive vs. negative: baby – shark) in the incongruent condition (Fazio, 2001; Fazio, Sanbonmatsu, Powell, & Kardes, 1986). In an evaluative judgment task (i.e., a pleasant vs. unpleasant decision) on visible target stimuli, responses are typically faster when primes and targets exhibit the same valence (for reviews, see Fazio, 2001; Klauer & Musch, 2003; for a meta-analysis, see Herring, White, Jabeen, Hinojos,

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Terrazas, Reyes, Taylor, & Crites, 2013). Evaluative priming is also observed, when the prime stimulus is briefly presented and masked by a visual pattern (e.g., random sequence of letters) so that it cannot be consciously perceived (e.g., Abrams, Klinger, & Greenwald, 2002; Draine & Greenwald, 1998; Greenwald, Draine, & Abrams, 1996; Klauer, Eder, Greenwald, & Abrams, 2007; Klauer, Mierke, & Musch, 2003; Wentura & Degner, 2010). The observation of unconscious (subliminal) evaluative priming shows that this effect depends on automatic processes, which are triggered involuntarily.

However, the precise nature of the processes underlying masked evaluative priming is a matter of debate. This is particularly due to the fact that evaluative subliminal priming effects were small and only rarely observed for unfamiliar or novel primes, that is, primes that were never presented supraliminally for an evaluative categorization throughout the experiment as a target (Klauer et al., 2007; Wentura & Degner, 2010).

The dominant account of evaluative priming in the evaluative decision task is the response activation account (Klauer, Rossnagel, & Musch, 1997; Klinger, Burton, & Pitts, 2000; Wentura, 1999). In this task, evaluatively congruent and incongruent prime-target pairings differ not only with regard to evaluative congruency, but also with regard to response congruency: In congruent trials, primes and targets are associated with the same response, whereas in incongruent trials they are associated with different responses. In congruent trials, the response to the target is quickly selected as the response pathway already has received some activation. In incongruent trials, target responding is slowed down by a response conflict (Damian, 2001; Klauer et al., 1997; Klinger et al., 2000; Wentura, 1999). Consequently, the response-related processing account conceptualizes evaluative priming in the evaluative decision task as a variant of response priming.

We are aware that evaluative priming can also arise from automatic activation of emotional semantic prime features, which facilitates subsequent target processing, as proposed in semantic activation accounts (Fazio et al., 1986; Spruyt, De Houwer, & Hermans, 2009). However, in behavioral studies, semantic activation processes can only be unequivocally demonstrated in target tasks such as pronunciation, in which evaluative congruency is independent of response congruency (Spruyt, Hermans, De Houwer, & Eelen, 2002; Spruyt, Hermans, Pandelaere, De Houwer, & Eelen, 2004). As the present work investigates mechanisms underlying masked priming in the evaluative decision task, we focus on response activation processes and do not discuss semantic activation in detail (for attempts to disentangle processes by using evaluative categorization data, see Eder, Leuthold, Rothermund, & Schweinberger, 2012; Voss, Rothermund, Gast, & Wentura, 2013).

Within the class of response priming accounts, however, two variants can be distinguished: According to one variant, response priming is based on a direct association between the prime stimulus and the response (Damian, 2001; Klinger et al., 2000) which is acquired during the experiment, perhaps already during a practice phase. This S–R learning can take place when targets are also used as primes.[1] If priming is based on acquired S–R associations, only primes which are also presented as targets should elicit priming effects (Abrams & Greenwald, 2000). It has been claimed that S–R learning explains at least a large part of subliminal priming effects (Damian, 2001; Klinger et al., 2000).

According to the second variant, response priming is based on the implicit application of task-control representations ('task sets') (Ansorge, Kunde, & Kiefer, 2014; Klauer et al., 2007; Kunde, Kiesel, & Hoffmann, 2003; Neumann, 1990) to the prime, whether consciously presented or subliminally, although it is not required by the task. This account was originally developed for explaining subliminal response priming effects based on non-emotional stimuli such as visual shapes or colors (Ansorge & Neumann, 2005; Neumann, 1990; Neumann & Klotz, 1994), but can be easily applied to the field of masked evaluative priming. According to this view, participants establish a task set on the grounds of the experimental instruction (e.g., "press left key in response to a positive stimulus, press right key in response to a negative stimulus"). If the prime matches this prepared task set, the task set is executed and the corresponding response is activated. This task set execution account of response priming allows for some flexibility compared with an S–R account, because it predicts priming also for unfamiliar, novel primes, which are not presented as targets. Unfamiliar primes can lead to task set execution, as long as they are sufficiently similar to the information specified in the task set (Kunde et al., 2003). This includes an at least coarse semantic analysis of the prime stimulus, especially with regard to its valence, in order to determine whether it is suited to execute the task set (Dehaene, Naccache, LeClec'H, Koechlin, Mueller, Dehaene-Lambertz, van de Moortele, & LeBihan, 1998; Kiesel, Kunde, Pohl, & Hoffmann, 2006). Furthermore, the task set execution account of response priming opens the room for attentional influences such as stimulus expectations, which determine whether a unfamiliar prime is able to elicit priming effects (Kiefer, 2012; Kiefer & Martens, 2010).

Many studies within the field of unconscious priming support this task set execution account (for a recent review, see Ansorge et al., 2014): As already noted above, masked evaluative priming with unfamiliar primes that are never presented supraliminally throughout the experiment has occasionally been observed (Klauer et al., 2007; Wentura & Degner, 2010). Furthermore, subliminal visuo-motor priming effects were influenced by action intentions and stimulus expectations (Ansorge, Heumann, & Scharlau, 2002; Ansorge, Kiefer, Khalid, Grassl, & König, 2010; Ansorge & Neumann, 2005; Tapia, Breitmeyer, & Shooner, 2010; Wokke, van Gaal, Scholte, Ridderinkhof, & Lamme, 2011). There is also evidence that evaluative priming depends on task sets. Evaluative congruency of subliminally presented masked prime words elicited only priming effects on the subsequent target during an evaluative decision, but not during a non-emotional semantic (living/non-living)

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[1] To prevent a misunderstanding: Whenever we write in the remainder of the article about experiments with primes that appear as targets as well, prime and target in a given trial are always different stimuli even in the evaluatively congruent condition.