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Suggestion overrides the Stroop effect in highly hypnotizable individuals

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Abstract

Cognitive scientists distinguish between automatic and controlled mental processes. Automatic processes are either innately involuntary or become automatized through extensive practice. For example, reading words is a purportedly automatic process for proficient readers and the Stroop effect is consequently considered the "gold standard" of automated performance. Although the question of whether it is possible to regain control over an automatic process is mostly unasked, we provide compelling data showing that posthypnotic suggestion reduced and even removed Stroop interference in highly hypnotizable individuals. Drawing on a large sample of highly hypnotizable participants, we examined the effects of suggestion on Stroop performance both with and without a posthypnotic suggestion to perceive the input stream as meaningless symbols. We show that suggestion administered to highly hypnotizable persons significantly reduced Stroop interference and derailed a seemingly automatic process.

Keywords: Automaticity; Stroop; Hypnosis; Attention; Suggestion

1. Introduction

Cognitive psychologists generally agree that mental processes come in two varieties: controlled and automatic (Shiffrin & Schneider, 1977). Some processes are thought to be innately automatic; others become automatic through practice (Spelke, Hirst, & Neisser, 1976). General accounts posit that once automatized, these processes are initiated unintentionally, effortlessly, even ballistically, and cannot be easily interrupted or prevented. While most researchers who are interested in automatic processes focus on the nature of automaticity and how a process becomes automatic, they have given little or no attention to whether one can regain control over a process that had been automatized. Despite its theoretical and clinical importance, the latter question is not only unanswered, but mostly unasked. The present study examined whether we can "unring" the proverbial bell (i.e., regain control over an ostensibly involuntary process). We report how a posthypnotic suggestion

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administered to highly hypnotizable individuals can override a process that has become automatized through practice (i.e., reading), and discuss the theoretical and applied implications of our findings.

Reading words is considered an automatic process; a proficient reader cannot withhold accessing word meaning despite explicit instructions to attend only to the ink color. The Stroop task provides evidence for the automaticity of reading: in responding to the ink color of an incongruent color word (e.g., the word "GREEN" inked in red), participants are usually slower and less accurate than in identifying the ink color of either a neutral or congruent word (e.g., "LOT" or "RED" inked in red) (Stroop, 1935). The difference between incongruent and congruent stimuli—the Stroop effect—is one of the most robust and well-studied phenomena in attentional research (MacLeod, 1991; MacLeod & MacDonald, 2000). The standard account posits that words are processed automatically to the semantic level and that the Stroop effect is the "gold standard" of automated performance (MacLeod, 1992).

A few meditative practices claim to achieve "de-automatization" (Dillbeck, 1982) with some sparse evidence of reduced Stroop interference (Alexander, Langer, Newman, Chandler, & Davies, 1989; Wenk-Sormaz, 2005). In addition, a number of studies have independently challenged the robustness of the Stroop effect showing either decrease or elimination of Stroop interference (Besner, 2001; Besner & Stolz, 1999a; Besner & Stolz, 1999b; Besner & Stolz, 1999c; Besner, Stolz, & Boutilier, 1997; Dishon-Berkovits & Algom, 2000; Melara & Algom, 2003; Pansky & Algom, 2002). Although critiqued (Neely & Kahan, 2001), interpretation of these and other findings of either reduction (Long & Prat, 2002) or removal (Kuhl & Kazén, 1999) of Stroop conflict contends that rather than being inevitable, other factors (e.g., attention, memory, and affect) may govern automatic processing. These findings suggest that a seemingly automatic process can be derailed.

Drawing on a larger sample, the present study provides a replication of our previous results and addresses the following question: Is it possible to regain control over a process that has been automatized? To answer this query, we drew on data from multiple experiments showing that a suggestion to experience Stroop words as meaningless symbols can modulate the Stroop effect in highly hypnotizable individuals—about 10–15% of the adult population who can be reliably identified as highly compliant with hypnotic suggestion using standardized scales (Comey & Kirsch, 1999; Kirsch, Capafons, Cardena-Buelna, & Amigo, 1999; Kirsch, Lynn, & Rhue, 1993; Shor & Orne, 1962; Weitzenhoffer & Hilgard, 1962). This approach (Raz, Shapiro, Fan, & Posner, 2002) was reported in a series of studies employing hypnotic suggestions (Egner et al., in press) and consequently extended to a posthypnotic suggestion—a suggestion made during hypnosis indicating that a particular experience or behavior will occur on cue following termination of the hypnotic session (Raz, 2004; Raz, Fan, & Posner, 2005; Raz et al., 2003; Raz et al., 2002)—and was recently replicated in an independent laboratory (Raz, Kirsch, Pollard, & Nitkin-Kaner, 2006). However, since this notion and findings were first reported in the clinical literature (Raz & Shapiro, 2002; Raz et al., 2002), it may have been missed by the cognitive scientists who would be most interested in it. Here, we report behavioral data from a larger sample of highly hypnotizable persons, discuss the findings in light of our recent neuroimaging data, and outline the potential implications of overriding an automatic process for cognitive neuroscience.

2. Method

2.1. Participants

Participants were 49 right-handed proficient readers of English (24 female) aged 20–35 (mean = 27) years. All participants were recruited from a pool of about 350 volunteers who had been screened for suggestibility in a hypnotic context using both the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A), (Shor & Orne, 1962) and then the Stanford Hypnotic Susceptibility Scale, Form C, (SHSS:C) sans the anosmia to ammonia challenge (Weitzenhoffer & Hilgard, 1962). All participants scored in the highly susceptible range (10–12 out of a possible 12 on the HGSHS:A; 9–11 out of a possible 11 on the SHSS:C). Data were acquired from all participants, some of whom have participated in previous studies.

After receiving an explanation of the procedures, participants provided written informed consent. Preceding the experiment, an experimenter notified the participants that the purpose of the study was to investigate the effects of suggestion on cognitive performance in highly suggestible individuals.