



Research Review

Content and process priming: A review ☆

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Abstract

The last forty years of social science research have produced over 12,000 articles on priming. The range, complexity, and novelty of priming effects are hard to comprehend, let alone explain, using a single model or perspective. In this review, we discuss content priming and process priming effects. We then propose an integrative model that can account for the combined results.

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## Introduction

Priming is an experimental framework in which the processing of an initially encountered stimulus is shown to influence a response to a subsequently encountered stimulus. Priming occurs because the processing of the prime stimulus makes content, and the cognitive operations used to comprehend and manipulate this content, more accessible. In turn, accessible content and operations can influence subsequent judgments, decisions and overt behavior. Priming can occur without awareness of the factors that increase the accessibility of the content and operations. Priming can also influence all stages of information processing, including attention, comprehension, memory retrieval, inference, and response generation (for a review, see Förster & Liberman, 2007; Wyer, 2008).

Priming paradigms have five basic characteristics. First, there must be a prime stimulus and a target stimulus. Second, the prime must alter a judgment about, or response to, the target stimulus. Third, a specific characteristic of the prime must be responsible for the altered response to the target stimulus. Fourth, the influence of the prime on the target stimulus should be temporary. That is, learning paradigms (e.g., classical conditioning, associative learning) are not priming paradigms. Finally, the effects of primes are unintended and can occur without awareness; when individuals become aware of the possible biasing effect of a prime, they often try to correct for its influence (Lombardi, Higgins, & Bargh, 1987; Martin, Seta, & Crelia, 1990; see also Wegener & Petty, 1994).

The literature on priming effects is vast, making a comprehensive review impossible. Consequently, our review will not address classes of priming effects that are not of direct relevance to consumer psychology. First, visual priming of object locations in visual search and identification task will not be reviewed (Kristjánsson & Campana, 2010). Second, lexical priming effects, priming that occurs because words often occur contiguously (needle, thread), on word identification or recognition will not be discussed (Jones & Estes, 2012). Third, reaction time investigations into the influence of orthographic, phonetic, and semantic priming on memory retrieval will not be reviewed (Schmidt et al., 2011). Fourth we will not discuss priming effects in survey responses (Sudman, Bradburn, & Schwarz, 1996). Fifth, we will not review negative priming effects (Tipper, 2001). Sixth, we will not address priming that operates via metacognitive attributions (e.g., fluency effects) (Reber, Schwarz, & Winkielman, 2004).

Finally, we will not address priming effects in impaired populations (Schacter & Buckner, 1998).

Our review is organized into five parts. First, we discuss content priming. Content priming involves attempts to influence the content that will be used in a cognitive process. Second, we discuss cognitive process priming. Cognitive process priming involves attempts to influence the processes that will operate on content. Third, we discuss the interface between content priming and cognitive process priming. Historically, these two types of priming have been assumed to be independent. Yet, there is growing evidence that this may not be the case. Fourth, we propose a hybrid model that can allow for content priming, process priming, or a synergistic influence of the two. Finally, we discuss research opportunities implied by a hybrid model as well as methods for investigating these topics.

## Content priming

Content priming effects occur when the perception of a piece of information makes the mental representation of that information, or content, more accessible. In turn, more accessible content can influence a subsequent response. An increase in the accessibility of content increases the likelihood the content will be integrated into ongoing perceptions, judgments, and choices.

Models of content priming take a variety of forms, but all can be encompassed by the associative network representation in Fig. 1. Fig. 1 shows that knowledge consists of four types of content: semantic, affective, goal (motivational), and behavioral (motor). Within these classifications of content are the classes of primes that are commonly studied. For example, semantic content refers to persons, events, objects, attributes, and the relations between them. It can also refer to beliefs about oneself and the world in general, scripts, personal experiences, implicit theories, or the steps required to attain a goal.

Each of these types of content can be *directly* or *indirectly* primed. As Fig. 1 indicates, direct priming occurs when a stimulus increases the accessibility of content that is a direct consequence of experiencing the stimulus (e.g., prime A can increase the accessibility of semantic content, prime E can increase the accessibility of behavioral content). Indirect priming occurs when a stimulus increases the accessibility of content that is associated with the directly primed content, and this associated content influences a subsequent perception judgment, or overt behavior (e.g., semantic prime A makes semantic content associated with

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