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Priming Effects Replicate Just Fine, Thanks

In response to a ScienceNews article on priming effects in social psychology.
Posted May 11, 2012

What follows is a response to a recent article in *ScienceNews* on the replicability of priming effects in social psychology. [Also relevant is a new article in Nature online by Ed Yong concerning the replication issue.]

Mr. Bower's article presents comments from researchers on both sides of the question of whether priming effects on social judgment and behavior exist, how reliable these effects are, and how strong of a role they may play in real life situations. The article does not attempt to present the reader with any factual information about these effects such as whether they indeed have been replicated in the scientific literature, or whether they have been the subject of review articles, and what the conclusions of those reviews have been.

Instead Mr. Bower follows a "he said/ she said" approach, which is as unhelpful a way to get at the truth of a scientific matter as it is in the courtroom (and yes, in science journalism as well.) In science the way to answer questions about replicability of effects is through statistical techniques such as meta-analysis, as well as qualitative reviews of the literature. These are presented below, in an attempt to set the record straight for readers of ScienceNews regarding the replicability of priming effects over the past 30 years of research. I give the citation to each of the publications discussed here as well as links so that readers interested in the underlying reality of the issue can see the actual evidence for themselves, instead of merely reading the opinions of a handful of people about that evidence.

1. Published replications of the elderly priming (walking slow) effect

The original focus of replication failures of priming effects on behavior was Doyen et al.'s PLOS publication last January of their failure to replicate the elderly priming study of Bargh et al. 1996. The Science News article does not mention that there are already at least two successful replications of that particular study by other, independent labs, published in a mainstream social psychology journal. Here are links to these two replications. Both appeared in the *Journal of Personality and Social Psychology*, the top and most rigorously reviewed journal in the field. Both articles found the effect but with moderation by a second factor: Hull et al. 2002 showed the effect mainly for individuals high in self consciousness, and Cesario et al. 2006 showed the effect mainly for individuals who like (versus dislike) the elderly.

Hull, J., Slone, L., Metayer, K., & Matthews, A. (2002). The nonconsciousness of self-consciousness. *Journal of Personality and Social Psychology, 83,* 406-4254.

Cesario, J., Plaks, J., & Higgins, E. T. (2006). Automatic social behavior as motivated preparation to interact. *Journal of Personality and Social Psychology, 90,* 893-910.

Moreover, at least two television science programs have successfully replicated the elderly-walking-slow effect as well, (South) Korean national television, and Great Britain's BBC1. The BBC field study is available on YouTube:

BBC1 Science demonstration of elderly walking study

2. Priming effects on impression formation.

In the 1980s cognitive psychologists were skeptical that semantic priming could affect anything more than lexical effects -- activation of single words, and certainly not more abstract concepts such as trait concepts as used in impression formation. Yet 30 years later well over 200 studies have shown such priming effects on impression formation as well as on social behavior, and meta-analytic reviews over 25 years of priming research (deCoster & Claypool, 2004) have shown statistically reliable effect sizes across these studies. The skeptics were wrong back in the 1980s, and they continue to be wrong today concerning priming effects on behavior and motivation. Time will tell, as it did before.

DeCoster, J., & Claypool, H. M. (2004). A meta-analysis of priming effects on impression formation supporting a general model of informational biases. Personality and Social Psychology Review, 8, 2-27. doi: 10.1207/S15327957PSPR0801_1

3. Sequential priming effects and social behavior.

More recently, Cameron, Brown-Iannuzzi, & Payne (2012) have just published a meta-analysis of sequential priming effects as they relate to social behavior as well as explicit attitudes, concluding across 167 studies that implicit attitudes as assessed by sequential priming methods (immediate, nonconscious effects of a prime on responses to a target presented a fraction of a second later) show a significant correlation (r = .28) with behavior towards the given attitude object. The authors conclude that "sequential priming – one of the earliest methods of investigating implicit social cognition – continues to be a valid tool for the psychological scientist."

Cameron, C. D., Brown-Iannuzzi, J. L., & Payne, B. K. (2012). Sequential priming measures of implicit social cognition: A meta-analysis of associations with behavior and explicit attitudes. Personality and Social Psychology Review (published online 5 April 2012). doi: 10.1177/1088868312440047

4. Replicability of subliminal priming effects across 59 independent studies.

Notably, given Mr. Doyen's comments in Mr. Bower's article dismissing the reality of subliminal priming, deCoster and Claypool (2004) reported a significant effect size across the 10 independent replications at that time of subliminal priming effects on impression formation, and showed that priming effect size was no different for subliminal than for supraliminal priming methods. And Cameron et al. (2012) reviewed a further 49 studies in which subliminal priming was employed. Here is their conclusion based on their statistical metaanalysis (p. 15):

"Twenty-six studies in the behavior analysis and 23 studies in the explicit attitudes analysis presented primed subliminally. Given this sample size, the lack of any difference between subliminal and visible primes seems meaningful. If subliminality makes little difference to the validity of priming tasks, then researchers may find it convenient to avoid methodological problems associated with subliminal priming such as difficulty verifying the absence of awareness."

I would only add to Cameron et al's conclusion that the converse is true as well: that researchers can also avoid the methodological problems alleged by Doyen and colleagues regarding supraliminal priming, such as potential experimenter demand or expectancy effects, by using subliminal priming instead. Indeed, this was the original reason that Paula Pietromonico and I first used subliminal priming (brief and unpredictable parafoveal presentation) in our 1982 study of automaticity in impression formation.

Thus we have 59 peer-reviewed, published studies in which subliminal priming produced significant effects, and these effects have been shown statistically to not differ in strength or probability from those found in supraliminal priming studies.

5. Priming of social behavior (including important behaviors such as voting)

Regarding the priming of social behavior, research since the original Bargh et al 1996 demonstration of social-behavior priming has similarly replicated that effect, as concluded by reviews such as Wheeler & deMarree (2009), Dijksterhuis & Bargh (2001), and Wheeler & Petty (2001).

Here is the opening paragraph of the most recent of these (Wheeler & deMarree 2009; references they cite are omitted here for ease of reading):

"Environmental stimuli [primes] can subtly activate mental constructs that direct behavior even when people are unaware of the source of activation. For example, casting one's vote in a school (vs. another polling location) can increase the likelihood of one supporting a sales tax increase to fund education, even though people are unlikely to identify polling location as an input into their decision making. An extraordinarily wide range of behaviors can be affected by subtle environmental stimuli, such as walking speed, speech volume, academic performance, economic decisions, helping, and cleaning, just to name a few. Although these effects are robust and widespread, their underlying basis is still debated…

"Since the seminal Bargh, Chen, and Burrows (1996) paper documenting prime-to-behavior effects, researchers have established extensive and pervasive effects of construct accessibility on behavior. What were once considered shocking and controversial effects are now widely accepted among social psychologists. More recent work has focused not on demonstrating that such effects occur, but on showing how and when they operate. This research has uncovered a wide variety of moderators, both individual difference and situational, that can affect the direction and magnitude of prime-to-behavior effects, and these moderators have been a key basis for arguing for or against various prime-to-behavior mechanisms… The increasing array of mechanisms reduces parsimony, but increases veridicality and suggests that construct accessibility can potentially contribute to much of the diversity of behavior observed in the world around us" (pp. 566, 577).

Wheeler, S. C. & DeMarree, K. G. (2009). Multiple mechanisms of prime-to-behavior effects. Social and Personality Psychology Compass, 3, 566-581.

Wheeler, S. C., & Petty, R. E. (2001). The effects of stereotype activation on behavior: A review of possible mechanisms. Psychological Bulletin, 127, 797-826.

Dijksterhuis, A., & Bargh, J. (2001). The perception-behavior expressway: Automatic effects of social perception on social behavior. In M. P. Zanna (Ed.s), Advances in experimental social psychology (Vol. 33, pp. 1-40). San Diego, CA: Academic Press.

For some specific examples, DeMarree, Wheeler, & Petty (2005) found that participants primed with the African American stereotype showed greater aggressive tendencies on an implicit measure of aggression (consistent with Bargh et al. 1996 Study 3 in which the primes were subliminally presented African-American faces), and that those primed with the university-professor stereotype engaged in more effortful, deliberate thought (consistent with that stereotype) about an advertisement compared to participants primed with the supermodel stereotype.

DeMarree et al. extended the basic stereotype-behavior effect in their demonstration that low self-monitors show these priming effects more strongly than high self monitors. Low self monitors are characterized by a stronger influence of internal states such as attitudes and beliefs on their overt behavior, compared to high self monitors whose behavior is characterized by stronger influences of external situational influences such as social norms (ie, what other people are doing; see Snyder, 1974).

DeMarree, K. G., Wheeler, S. C., & Petty, R. E. (2005). Priming a new identity: Effects of non-self stereotype primes and self-monitoring on the self-concept. Journal of Personality and Social Psychology, 89, 657-671.

Snyder, M. (1974). Self-monitoring of expressive behavior. Journal of Personality and Social Psychology, 30, 526–37.

As noted above, the elderly-priming (walking slow) effect was itself replicated and extended by Hull et al. (2002) and Cesario, Plaks, & Higgins (2006). The extensions were to show that the effect mainly occurred for those high in self consciousness and who liked the elderly. Putting these findings together with those of DeMarree, Wheeler, and Petty (2005) who show stereotype-to-behavior effects mainly for low self monitors, a general pattern emerges. The behavior of high self conscious individuals and low self monitors (who, despite the label, are more influenced by internal than external factors in their behaviors) is more affected by internal states (such as stereotype activation) than is the behavior of other people. The key moderator of stereotype-to-behavior effects -- that is, when a researcher will be more versus less likely to obtain them -- thus seems to be an internal focus of attention or a chronic tendency to use internal states as guides as to how to act. To fit the Cesario et al. 2006 finding here, that the opposite effect (walking faster) occurs for individuals who do not like the elderly, people do have the general tendency to show the opposite of their usual tendencies towards people and groups they do not like, for example, the work of Chartrand and colleagues on imitation tendencies shows that while we normally unconsciously imitate others, we do not imitate those we do not like.

To conclude, contrary to the views expressed in the Science News article and elsewhere in the media lately, priming effects -- on social behavior as well as judgments -- are quite real and replicate just fine, thank you. They can be produced through a variety of methods, and influence important as well as mundane real world behaviors and judgments. They have become a standard tool in which to ascertain implicit beliefs that are then shown also to predict actual behavior, across hundreds of published research studies in peer-reviewed journals, from dozens of different laboratories and many different research teams. Research has now moved on from the demonstration and replication of priming effects on social judgment and behavior to research on the mechanisms underlying the effects and the moderators, constraints, and limitations of those effects.