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Cognition and the self: Attempt of an independent close replication of the effects of self-construal priming on spatial memory recall

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ABSTRACT

Do different modes of thinking about the self lead to differences in performance on a contextual memory task? We conducted a pre-registered replication of the study of self-construal priming on spatial memory by Kühnen and Oyserman (2002; Study 2), simultaneously evaluating the role of task-compliance, operationalization specificity, and cross-cultural robustness. In the original study, participants either circled first-person plural (interdependent condition) or singular pronouns (independent condition) when reading a passage and subsequently memorized and recalled a set of objects presented on a visual-spatial grid. When employing a digital version of the original procedure, we were able to replicate the original findings, with better recall of objects in their original location in the interdependent (vs. independent) condition. Notably, the effect of self-construal priming on spatial memory was strongest when screening out participants who did not comply with instructions on the pronoun task and absent when including non-compliant participants. Moreover, in contrast to the original study, effects of priming were not specific to object- & -location operationalization of spatial memory recall, and also present for location-independent object recall and object-independent spatial placement recall. Additionally, condition effects were robust across observed cultural differences: Though white participants performing less successfully compared to non-white participants, both groups were comparably susceptible to priming effects. We discuss the present results and insights learned from the replication process in light of the on-going debate about the replicability of psychological experiments, highlighting the notion of task-compliance, methodological transparency and cross-cultural factors for further advancement of psychological science.

1. Introduction

Psychological research from the last two decades suggests that an interdependent self-focus, compared to an independent self-focus, has downstream consequences for holistic cognitive style (Markus & Kitayama, 1991; Nisbett, 2003; Oyserman & Lee, 2008; Varnum, Grossmann, Kitayama, & Nisbett, 2010), because interdependence promotes spontaneous binding of objects with their contexts (Duffy & Kitayama, 2007; Masuda & Nisbett, 2001; Nisbett & Miyamoto, 2006). Kühnen and Oyserman (2002; Study 2) have provided a critical test of this hypothesis, demonstrating that circling first-person plural pronouns (representing an interdependent self) as compared to first-person singular pronouns (representing an independent self; Gardner, Gabriel, & Lee, 1999) promoted greater recall of objects placed on a visual-spatial grid on a subsequent task. Kühnen and Oyserman concluded that interdependent self-focus (or self-construal; cf. Cross, Hardin, & Gercek-Swing, 2011) induces a context-bound style of thought, which facilitated encoding of location information, thereby enhancing performance on a task benefitting from contextualized memory.

1.1. Importance of the causal link between self-focus and higher-order cognition

The approach of temporal activation of an interdependent vs. independent self-focus belongs to the broad family of experimental techniques aiming to heighten collectivism vs. individualism, respectively (Oyserman & Lee, 2008). Individualism-collectivism reflects as a loose set of interrelated constructs involving interdependent vs. independent self-focus, value of filial piety and appreciation of close others vs. value of uniqueness and personal achievements, and focus on similarities vs. differences in social comparisons (e.g., Grossmann & Na, 2014; Triandis, 1989; Vignoles et al., 2016; Wheeler, Reis, & Bond, 1988). Priming one of these constructs to elicit a response in line with the overarching theme of individualism-collectivism provides a useful method for probing the nomological network of individualism-

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collectivism. Notably, Kühnen and Oyserman's study went beyond testing the nomological network of individualism-collectivism, observing that interdependent (vs. independent) self-focus priming impacts performance in an unrelated domain of non-social object recall. Thereby, this study has provided a *cross-domain* link between features of individualism-collectivism and one's cognitive style (e.g., Nisbett, 2003; Varnum et al., 2010).

Since its publication, Kühnen and Oyserman (2002) work has been highly influential, with over 300 citations on Google Scholar. The claim that interdependent (vs. independent) self-focus results in more holistic or context-sensitive higher-order cognition on an unrelated task has been utilized across a wide range of fields to advance theories on psychological distance (Trope & Liberman, 2010), causal attributions (e.g., Choi, Nisbett, & Norenzayan, 1999; Grossmann & Varnum, 2011; Kraus, Piff, & Keltner, 2009), cognitive dissonance (e.g., Kimel, Grossmann, & Kitayama, 2012), emotion regulation (e.g., Kross & Ayduk, 2011), creativity (e.g., IJzerman, Leung, & Ong, 2014), personality (e.g., Konrath, Bushman, & Grove, 2009), wisdom (Grossmann, 2017; Grossmann, in press; Grossmann & Kross, 2014), and especially culture (e.g., Cohen, Hoshino-Browne, & Leung, 2007; Miyamoto, 2013; Oyserman, Sorensen, Reber, & Chen, 2009; Uskul, Kitayama, & Nisbett, 2008; Wyer, Chiu, & Hong, 2009).

1.2. How robust is the effect of self-construal priming on non-social cognition? Review of prior research and power considerations

The seminal meta-analysis exploring effects of priming individualism and collectivism on self-perceptions, social judgments, and non-social cognition (Oyserman & Lee, 2008) suggested a medium-size effect of self-construal priming on cognitive processes. However, only eight studies included in the meta-analysis (Oyserman & Lee, 2008; Table A5) have assessed effects on non-social cognitive processes such as location-cued object memory. Only three of these studies employed the pronoun circling paradigm. Only Kühnen and Oyserman (2002; Study 2) measured higher-level cognition, whereas the other two studies tested object perception (Kühnen, Hannover, & Schubert, 2001; Study 4; Kühnen & Oyserman, 2002; Study 1; for methodological considerations, also see on-line supplement). More recently, some work provided conceptual replications of the original findings by Kühnen and Oyserman. Two studies were conducted by one of the original authors, showing that the self-construal priming effects on location-cued memory hold when adopting the original instructions into Korean and Cantonese languages and sampling Korean/Korean-American and Hong Kong Chinese students (Oyserman et al., 2009; Studies 1–2). Another independent conceptual replication has utilized an altered self-construal priming procedure and has employed a conceptually-related multi-trials working-memory binding task, demonstrating a conceptual replication of the original study on a sample of older Italians (Mammarella & Fairfield, 2013).

At the same time, several studies have reported failures to replicate the claims that experimental shifts in self-construal alter cognitive style. Some work produced inconclusive patterns of results when attempting to replicate perception results from Kühnen and Oyserman (2002; Study 1) in a within-subject design (Lin, Lin, & Han, 2008): Whereas the behavior-based data failed to replicate the original results, related neurophysiological data suggests possible shifts in perception processing due to condition. Further findings from the same laboratory provided a conceptual replication of the effects of self-construal priming on perceptual processes (Lin & Han, 2009; for methodological considerations, also see on-line supplement). Most recently, Drouin and Davidson (2015) have conducted four experiments to replicate the effect of self-construal priming on location-cued recall on Canadian undergraduates, including one study that closely followed the original procedure (Study 1), two conceptual replication attempts that increased the length of the priming task (Studies 2–3) and one close replication that copied stimuli and procedure from the original study. Only in the first study did Drouin and Davidson (2015) find partial support to the original hypothesis, with interdependence (vs. independence) priming leading to a better recall of location-cued objects among male participants. Neither female participants in this first study, nor any subsequent sample did indicate a significant difference between conditions. Together, these findings appear to paint an inconclusive picture concerning claims about the robustness of self-construal priming effects on non-social cognition.

One critical question for evaluating robustness of any given behavioral effect concerns the notion of statistical power and its intimate connection the observed effect size (J. Cohen, 1992). Reflection on power can shed some light on the reliability of the effect and the likelihood of its replicability. Hereby, it is notable that two of the previous studies reported moderate-high effects, but have employed small sample sizes (Kühnen & Oyserman, 2002; Study 2; $N = 34$, $d = .69$; Mammarella & Fairfield, 2013; $N = 48$, $d = .63$). Such small samples are more likely to yield unreliable estimates (e.g., J. Cohen, 1992; Gervais, Jewell, Najle, & Ng, 2015). In contrast, studies that employed larger sample sizes either indicated just-significant ($p = .04$) smaller effects (Oyserman et al., 2009; Study 1: $N = 91$, $d = .36$; Study 2: $N = 126$, $d = .31$) or failed to observe significant effects altogether (Drouin & Davidson, 2015;Study 1: $N = 145$, $d = .38$; Study 2: $N = 90$, $d = .06$; Study 3: $N = 101$, $d = .12$; Study 4: $N = 96$, $d = -.12$). Overall, it appears that larger samples than those used in the initial work would be necessary to evaluate the robustness of the original work.

1.3. Reliability beyond significance-level and effect size

Given that psychological experiments have a probabilistic chance of finding an effect within a certain range, it appears useful to branch out beyond power considerations and consider effect's boundary conditions. Such circumstances include the operationalization of the dependent variable, analytical procedure, as well as cultural and other demographic considerations. Consideration of these points has implications for inferences drawn from the results reported in the original and replication studies. We will reflect on each of these points next.

1.3.1. Operationalization of the dependent variable

The original study and the follow-ups by Oyserman et al. (2009; Studies 1–2) reported that the effect of priming holds only for recall of objects corrected placed on a visual-spatial grid rather than total recall of objects. In the original study, the authors interpreted this observation as an indication that priming-induced differences in memory dissipate when context information is ignored. However, the large body of evidence on episodic memory indicates that in intentional learning paradigms like the one employed in the original and replication studies, participants can deliberately use information presented on the spatial display as a mnemonic strategy to prepare for the memory test on objects (Köhler, Moscovitch, & Melo, 2001; Mandler, Seegmiller, & Day, 1977; Naveh-Benjamin, 1987). Though such mnemonic strategies may include memorization of absolute location, they also include memorization of the relative location of different objects to each other, clustering of objects based on their possible relationship and so on. If interdependent self-construal promotes holistic cognitive style, each of these strategies may be a viable option to enhance one's memory recall of objects. Notably, mnemonic strategies of relative location recall or functional clustering of objects do not need to depend on the accuracy in absolute location recall. Because the instructions in the memory recall task primarily focus on object recall and only secondary on its location, interdependence priming should have facilitated total object recall (i.e. irrespective of where these objects are placed) at least as well as recall of objects correctly placed in their location. Indeed, the effects observed in the partial independent replication of the originals study by Drouin and Davidson (2015; Study 1) indicated similar effects of self-

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