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Using true experiments to study culture: Manipulations, measurement issues, and the question of appropriate control groups

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A B S T R A C T

Social group memberships are primarily studied in quasi-experimental contexts, but how can culture, class and gender be manipulated in true experimental designs? This review highlights the different empirical strategies that can be used to manipulate "culture" as it relates to race/ethnicity (activation of thinking styles, language, and priming of cultural constructs), class (social standing, group status, or perceived social status), and gender (role salience, gender identity, sex hormone administration). I review measurement issues related to manipulation checks and the problem of what construct is tapped by the manipulation, appropriate control groups, and intersectional identities or group memberships.

In the last two decades, a growing and compelling body of research has highlighted the fact that much of what psychology previously assumed to be universal may, in fact, be subject to cultural influences (e.g., the idea that much of psychology is WEIRD: Western, Educated, Industrialized, Rich, and Democratic; Henrich, Heine & Norenzayan, 2010). Consistent with this line of thinking, a large and substantive body of research has now demonstrated the myriad ways in which phenomena across subfields of psychology (social, developmental, cognitive, abnormal, etc.) can be moderated by social group membership. Nevertheless, much of this literature is based on quasi-experimental and non-experimental designs, making inferences about causality difficult to establish. Thus, this review highlights both the existing literature on manipulations aimed at demonstrating causality and provides a practical guide for future studies with this aim. The focus will be on three forms of culture: ethnicity, class, and gender.[1]

1. Defining "culture"

Since the notion of culture first became a subfield of psychological inquiry approximately three decades ago, discussions of it has explicitly included three broad social categorizations (ethnicity, class, gender), albeit the focus has been disproportionately on the first (e.g., see Betancourt and Lopez, 1993). On a basic and operational level, culture has largely been conceptualized as group membership in that most cross-cultural studies involve quasi-experimental comparisons between different racial/ethnic groups; insofar as more precise theoretical definitions, these have included "systems of meaning" (e.g., Rohner, 1984; as cited in Betancourt and Lopez, 1993) that include but are not limited to norms, beliefs, attitudes, values, and roles (see Triandis, 1993). More recent reviews of culture has further confirmed that culture can be construed as a constellation of norms and cognitions, transmitted via groups, that contribute to goals and can be "institutionalized" formally or not (Lehman et al., 2004). To this end, studies aimed at manipulating "culture" are primarily focused on manipulating cognitive processes, schemas, and mindsets associated with specific cultures.

In the effort to understanding the underlying mechanisms responsible for cultural differences, a growing number of studies have focused on "unpacking" culture via mediation models that can identify the precise cause of an observed group difference and then using subsequent experimental paradigms to manipulate said cause (e.g., what Heine and Norenzayan (2006) refer to as Stage 2 in cultural research). That said, these underlying dimensions responsible for cultural variability may not always be "cultural" per say; for example, numerous ecological differences between groups exist—e.g., related to resources, religion, and climate to name a few—that are well-known to influence the psyche but that are not strictly cultural (Matsumoto and Yoo, 2006). Most of the studies covered in this review focus on the cultural dimensions that have been identified (e.g. relating to self-construal, thinking style) rather than the non-cultural ones.

These considerations aside, it is also important to note that the vast

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majority of the cultural studies that exist have been conducted in the U.S., Europe, or East-Asia. While this has provided an excellent basis for understanding culture from East-West perspectives, far less is known about how these findings and manipulations would work in Africa, Latin-America, the Middle East, and South or Southeast Asia.

2. Manipulations relating to ethnic or national cultural differences

Manipulations involving facets of ethnic or national culture are the most studied and most varied of the three forms of culture; they primarily fall within three categories: manipulations involving instructions to engage in a culturally-specific style of thinking (in this case, usually East versus West), changing the language of the experiment or instrument, or exposing participants to stimuli representative of a particular ethnic or national culture. While the instructional and priming manipulations usually targets a specific cultural construct, manipulations involving language are not obviously targeted at a particular cultural construct (see Table 1). Moreover, more recent conceptualizations of culture have also relied on altering situational demands to elicit cultural mindsets.

In this section it is also important to note that the term "ethnicity" has typically been used by cross-cultural researchers to refer to groups like Asian-Americans, European-Americans, African Americans, Latino-Americans, etc. Ethnicity can refer to nationality/national origin but can also be shared across such lines on the bases of common cultural affiliation based on ancestral background, region, affiliation or language (e.g., Betancourt and Lopez, 1993). More broadly, given that culture in many ways can be conceptualized as "situated cognition" (that is to say, specific to location and time; Oyserman and Lee, 2007), it is not surprising that one of the most common ways of studying it involves examining people groups from distinct geographical locales—distinctions that, in the vernacular, are commonly referred to as ethnicity. This "situated cognition" conceptualization of culture (Oyserman and Lee, 2007; Oyserman, 2011, 2016; Oyserman et al., 2014) also lends itself to efforts to manipulate culture: after all, if culture variation is frequently the product of socialization processes and contextual cues, then altering the saliency of those features can very likely change the manifestation of culture itself. In their seminal 2007 chapter on this topic, Oyserman and Lee canvas the numerous ways in which culture (in terms of ethnicity) can be primed via a host of different cultural dimensions. In follow-up research, Oyserman et al. (2014) have relied on neuroscientific evidence to demonstrate that while universally, individualism and collectivism can be activated, culture dictates the cues that trigger one dimension over the other through a process of spreading activation. It follows, then, that individuals from different cultural backgrounds can have the same cultural "mindsets" momentarily activated via these primes; over time, chronic activation of the same mindsets become what we know of as "culture" (Oyserman, 2016).

2.1. Changing the way situations are conceptualized

This notion of culture as "situated cognition" (Oyserman and Lee, 2007; Oyserman, 2011, 2016; Oyserman et al., 2014) is also consistent with related approaches to explaining cultural variation like Yamagishi et al.'s (2008) "institutional approach" where culture is conceived of as a set of strategies used to adapt to social situations and the incentives that they carry. Thus, according to this framework, if cultural differences can be accounted for via individual's default responses to social structures (based on their beliefs or expectations about how others will react to these behaviors), then manipulating those structures could also lead to subsequent changes in culturally-bound actions. In support of this framework, Yamagishi et al. (2008) demonstrated that altering salient aspects of the situation could change the "default" response employed by members of different cultural groups.

To illustrate, Yamagishi et al. found that changing how Japanese and European-Americans interpreted choice in the classic pen-choice

paradigm (where, according to the original Kim and Markus (1999) experiment, the latter were more likely to choose a unique pen) could influence the extent to which they exhibited the cultural preference for uniqueness. While this variation emerged in the default situation where no efforts were made to change the interpretation of the situation, it did not emerge in situations where salient considerations about the scenario were highlighted—namely, when other people's choices were either saliently taken into consideration or not (Yamagishi et al., 2008). Their subsequent study yielded similar effects via a slightly different manipulation wherein monitoring by other people were made salient right beforehand or not.

This is also in line with previous work demonstrating a similar closing of the cultural gap via manipulations of the situational demands. Yamagishi (1988) had Japanese and European-Americans play a game in a group wherein the monetary payment for performance was equally divided among all the members, but participants were given the chance to exit the group at either a low or high cost. Interestingly, he found that Japanese participants exited the group more frequently, but that this difference only emerged under conditions of high cost. Yamagishi (1988) went to propose that this was because of concern over the free-rider problem, which is more of an issue in collectivistic contexts than individualistic ones. Thus, in these cases, the experimenters were manipulating culture not by targeting cultural dimensions, but rather, by changing the social structures set in place that were likely to activate those cultural tendencies in the first place. This institutional framework represents a compelling and alternative approach to "manipulating" culture.

Additional evidence for this situational approach comes from studies on relational mobility. San Martin et al. (2019) found that when participants were told about an organization that either facilitate high or low relational mobility and imagined themselves as employees there, this was sufficient to change their thinking styles. Namely, those who believed that relationships could be changed (i.e., freely entered into or left) were more likely to think holistically: they had more of an internal locus of control, made more dispositional attributions, and paid more attention to the context. This provides yet another example of how manipulating a socioecological feature of the situation can lead to cultural differences.

2.2. Activating culturally-bound thinking styles

Apart from the institutional framework of understanding cultural difference, the majority of other culture manipulations focus on changing a specific dimension related to ethnic group membership. Of these different types of cultural manipulations, the most targeted are the ones that involve explicit direction to engage in a culturally-specific thinking style—namely, holistic and dialectical versus analytic and focal, a classic distinction that can be made between Eastern and Western cultures. A substantive body of research has shown that while East-Asians tend to engage in thinking that is non-linear, contextual, and embracing of contradiction, European-Americans prefer thinking in more linear, focal, and non-contradictory ways (for review, see Nisbett et al., 2001; for more recent reviews, see Miyamoto, 2013; Spencer Rodgers et al., 2018). In line with these findings, manipulations aimed at changing these culturally-bound ways of processing information have generally relied on effortful, autobiographical, reflection-based tasks where participants are told to think about their life in either dialectical or linear ways. Some variations have limited the context to specific events or time periods (e.g., describing events related to when they were accepted into college, and either focusing on a single event or the interconnectedness between three separate events—Hideg & Ferris, 2017; thinking about a time during their teen years when their life was contradictory or stable—Paletz & Peng, 2009), while others were not (e.g., writing down evidence from their life in support of dialectical or linear thinking after reading a fabricated news article endorsing one of the styles—Ma-Kellams et al., 2011). Similar to the latter paradigm, an additional dialectical thinking manipulation asks participants to write about the

Table 1

Summary of common manipulations involving ethnic cultural differences.

Manipulations involving ethnic cultural differences	Cultural construct	Procedure	Manipulation check/effect of manipulation	Source
Activating thinking styles	Dialectical vs. analytic thinking	Dialectical thinking: list 3 life events related to getting accepted into university and describe how they were interconnected. Analytic thinking: list 1 event related to getting accepted into university and describe how that single event influenced their acceptance. In a similar modified version, an affirmative action policy was framed in dialectical terms (i.e., in an environment in constant flux) or not—Hideg & Ferris, 2017).	Those in the analytic condition showed stronger cause/effect magnitude correspondence compared to those in the holistic prime, although no difference between analytic and control (no prime) conditions (Spina et al., 2010). Independent coders coded whether descriptions contained contradictions or inconsistencies; those in the dialectical condition contained more than those in the analytic condition. Dialectical thinking led to more favorable attitudes towards affirmative action, as did affirmative action policy framed dialectically (Hideg and Ferris, 2017).	Spina et al. (2010) Hideg and Ferris, 2017
		Read a fabricated news article about scientific evidence in support of dialeciticism or linear thinking and write 2–3 paragraphs about evidence in support of this argument from their life.	Participants wrote a minimum of 2 paragraphs of evidence from their life in support of the argument they read; those in the dialecticism condition showed more explicit in-group derogation compared to those in the linear condition.	Ma-Kellams et al. (2011)
		Think about a time during adolescence when the world was full of contradiction or stable.	Number of transition words and qualifiers; marginal differences emerged between conditions and the thinking manipulation interacted with a contradiction manipulation to influence creativity	Paletz & Peng (2009)
		Write down the benefits of taking the middle ground or going to extremes	Dialectical prime led to more dialectical attitudes towards contradiction on the subscale of the Analysis Holism Scale or AHS (Choi et al., 2007)	DeMotta et al. (2016)
Language	In-group identification and values	Hong Kong Chinese complete a questionnaire in English vs. Chinese	Hong Kong Chinese endorsed more Chinese values when completed the questionnaire *in English*	Yang and Bond, 1980; Bond and Yang (1982); see also Oyserman and Lee (2008)
	Self- vs. other-focus in memory	Russian immigrants complete a questionnaire in Russian vs. English	Russian immigrants generated more self-related memories in English than in Russian	Marian and Kaushanskaya, 2004; see also Oyserman and Lee (2008)
	Self-concept & values	Chinese-Canadians complete a questionnaire in English vs. Chinese	Chinese-Canadians only differed from European-Canadians when they completed the questionnaire in Chinese (but not when they did so in English)	Ross et al., 2002; see also Oyserman and Lee (2008)
	Personality	Mexican-American bilinguals complete BFI (Big Five Inventory) and interview in Spanish vs. English	Mexican-Americans reported greater extraversion, agreeableness and conscientiousness in English than in Spanish	Ramírez-Esparza et al. (2006)
	Categorization	Chinese from Mainland China, Taiwan, Hong Kong & Singapore were tested in Chinese vs. English	Only Chinese from China and Taiwan showed more relational categorization in Chinese than in English	Ji et al. (2004)
Priming cultural constructs	I–C	Pronoun circling: participants read texts and either circled pronouns; experimental conditions contained pronouns mostly involving we/us, them/they, or it. Control condition involved circling adjectives that were either positive or negative	Those in both the "we" pronoun condition and positive adjective condition were more likely to judge ambiguous attitude statements as similar to their own, but the "we" condition also produced longer RT (reaction time) when it came to dissimilarity judgments; "we" condition also led to more interdependent self-descriptions on the TST (Twenty Statements Test; Brewer and Gardner, 1996). pronoun circling also influenced judgments about social obligations and collectivist values (Gardner et al., 1999)	Brewer and Gardner (1996); Gardner et al. (1999)
	I–C/interdependent vs. independent selves	Those in the interdependent condition thought about commonalities whereas those in the independent condition thought about differences between themselves and family/friends.	Manipulation yielded differences in self construals on the TST (Twenty Statements Test; Trafimow et al., 1991), problem solving speed on the Embedded Figures Task and self-rated contextual dependency on the Singelis Self-Construal task (Kühnen et al., 2001)	Trafimow et al. (1991);
	I–C (private vs. collective self)	Sumerian warrior story: participants read a story either about a general choosing a warrior based on personal gain (private self condition) or to benefit his family (collective self condition)	Those in the private self condition gave more idiocentric statements on the TST (20 Statements Test).	Trafimow et al. (1991)
	I–C (independence/ interdependence in self-construals)	Participants unscrambled sentences containing either words like individual, independent, self-contained or group, friendships, together.	Those in the interdependence prime condition cooperated more and reported being less concerned with their own gain	Utz (2004); see also Oyserman and Lee (2008) for review of priming

Table 1 (*continued*)

Manipulations involving ethnic cultural differences	Cultural construct	Procedure	Manipulation check/effect of manipulation	Source
	I–C	Subliminal priming: participants were exposed to words like same, group, team vs. I, compete, free for 35 ms (milliseconds), followed by a 75 ms mask.	Prime marginally interacted with valence to influence attributions of targets' behaviors and also changed the strength of the link between life satisfaction/future outlook.	Oishi et al., 2000; see also Oyserman and Lee (2007) for review of priming
	Attributions	Participants viewed Chinese vs. American icons	Chinese Americans made more internal attributions after American icons and external attributions after Chinese icons	Benet-Martínez et al. (2002)
	Attributions & positive emotions	Partipants viewed American and Mexican icons	Mexican-Americans made fewer external attributions and positive emotions when primed with American icons	Kreitler & Dyson (2016)
	Self-concept (individual vs. collective self)/ Cultural identity	Chinese and American students from completed 10 sentences that started with "I" (in English or Chinese) vs. "We" to activate self-concept. In a second study, the condition involved completing sentences with the prompt "I/we being Chinese/American" to make cultural identity salient.	Chinese mentioned more duties when speaking with the collective self (we); Americans mentioned more rights when speaking of the individual self (I). Chinese Americans mentioned more duties vs. right as a function of whether their Chinese or American self was activated.	Hong et al. (2000)
	Affiliation (interdependent vs. independent self-construal)	European-Americans were subliminally exposed to affiliation-related words (e.g., friend, partner) or neutral words for 62 ms.	Those exposed to the affiliation primes showed more choice justification when justifying a gift for a close other as opposed to themselves.	Kimel et al. (2012)
	Attention (holistic vs. analytic)	European-Americans and Japanese viewed photos of medium-sized cities in the USA and Japan	Across groups, those who viewed the Japanese cities decide more changes to an animated vignette compared to those who viewed the U.S. cities	Miyamoto et al. (2006)
Changing the demands of the situation	I–C	Japanese and European-Americans played a game in a group wherein monetary rewards were allocated to group members equally, but they were given the opportunity to exit the group at either a high or low cost	Cultural differences emerged in the high cost (of exit) condition, with Japanese participants exiting more and being less collectivistic, presumably because of the concern over the "free-rider" problem	Yamagishi (1988)
	Uniqueness	The pen-choice paradigm was replicated but with a manipulation beforehand that altered the saliency of other people's decisions or monitoring.	Cultural differences were attenuated with the saliency of other people's decisions or monitoring was activated	Yamagishi et al. (2008)
	Analytic/holistic thinking	Participants read about an organization that enabled low vs. high relational mobility and imagined themselves working there	Those in the high relational mobility condition made more dispositional biases, analytic thinking, and internal locus of control	San Martin et al. (2019) (based on materials from Li et al., 2015, 2016)

benefits of going to extremes versus the middle ground more generally, which reflects one of the principles of naive dialecticism (DeMotta et al., 2016). Here, the holistic or dialectical construct centers on the rejection the Western, Aristotelian law of the excluded middle (i.e., that a statement must be true or false—see Peng and Nisbett, 1999; DeMotta et al., 2016).

These dialectical thinking style manipulations appear to exert straightforward effects on self-reported attitudes towards contradiction (DeMotta et al., 2016) as well as attitudes towards other ideas like affirmative action (e.g., Hideg and Ferris, 2017). However, their impact on other outcomes like in-group/outgroup favoritism, judgments of cause/effects, and creativity appear to be more nuanced and depend on important moderators, like the level of analysis (e.g., implicit or explicit—Ma-Kellams et al., 2011), the comparison condition (e.g., with a no-prime control or an analytic thinking condition), and the presence of other manipulations (e.g., related to contradiction—Paletz & Peng, 2009). For example, in the context of group attitudes, dialectical thinking impacted explicit attributions about ingroups/outgroups but not implicit associations with those groups (Ma-Kellams et al., 2011). When it came to creativity in generating questions to scientific problems, thinking style manipulations appeared to interact with low much contradiction there was in the problem itself, with stronger effects emerging under

conditions of low contradiction (Paletz and Peng, 2009).

2.3. Using language as a cultural manipulation

If manipulations of thinking style represent the category of ethnic culture manipulations most clearly targeted at a specific cultural construct, on the other end of the spectrum are manipulations that rely on language, which is not clearly linked to a single facet of culture and instead is meant to induce wide-sweeping and varied changes related to culture. Unlike other cultural manipulations that can be done with members of any culture, language manipulations can only be used on bicultural individuals who can complete measures in their native or a more recently acquired language—in this case, usually English. A review of existing cultural psychology studies that have used language manipulations (see Oyserman and Lee, 2008) suggest that these effects can impact personality dimensions like the Big Five (Ramírez-Esparza et al., 2009), self-concept (Ross et al., 2002), group identification (Yang and Bond, 1980; Bond and Yang, 1982), categorization (Ji et al., 2004), memory (Marian and Kaushanskaya, 2004), time orientation (Pérez and Tavits, 2019), and self-enhancement (Lee et al., 2010). Moreover, even among bicultural and bilingual individuals, language fluency itself may not be entirely stable, but rather, can be influenced by other manipula-

tions, like exposure to cultural icons (Zhang et al., 2013).

2.4. Priming cultural constructs

Apart from dialectical thinking and language, priming cultural concepts occupies the largest category of manipulations that targets ethnicity. Here, "priming" is used loosely insofar as it refers to paradigms whose typical goal is to activate specific cultural schemas (e.g., individualism-collectivism), although in certain cases (e.g. in the case of cultural icons), such specificity may not be present. As such, they can take the form of reading passages (e.g., the Sumerian warrior story—Trafimow et al., 1991), unscrambling sentences (containing words related to cultural values, Utz, 2004), being exposed to visual images (e.g., cultural icons—Benet-Martínez et al., 2002), reflecting on oneself in the context of close others (Trafimow et al., 1991), and word searches (e.g., pronoun circling—Brewer & Gardner, 1996; Gardner et al., 1999). Oyserman and Lee (2007); Oyserman and Lee (2008) have extensively reviewed the culture and priming literature in the context of individualism-collectivism (I–C) and have found that the priming paradigm matters less than the outcome of interest (i.e., priming I–C appears to consistently work across the methods described below, but the magnitude of the effect appears to be stronger in some domains–i.e., certain categories of outcomes, like cognitive variables–than others). For the purposes of this review, the priming culture manipulations are treated as conceptually different from the aforementioned dialectical or holistic thinking paradigms because of the difference in intent and the precise cultural construct activated. While the previously discussed literature on dialecticism focused on changing the way people thought about and processed information about the world around them, the literature on priming culture focuses almost exclusively on promoting individualistic or collectivistic values. In other words, the former is about how to think, and the latter is about what to want, and although both are part of the definition of culture discussed in the introduction, they represent different facets of cultural difference.

Given the breadth and depth of Oyserman and Lee's meta-analysis (2008) and review (2007), this section will not reiterate all their findings; however, it may be helpful to summarize and highlight several key points regarding the culture and priming literature. In almost all such cases, the cultural construct of interest manipulated is independent versus interdependent selves. The pronoun circling paradigm (Brewer and Gardner, 1996; Gardner et al., 1999) involves reading a text that contains mostly the pronouns "we"/"us" vs. "them/they" vs. "it" and circling such pronouns; in the control condition, the task involves circling positive or negative adjectives; other studies have found that this manipulation even works in languages other than English (e.g., German and Dutch—Kuhnen, Hannover & Schubert, 2001; van Baaren et al., 2003, as cited in Nisbett et al., 2001). The other paradigms activate similar comparisons, albeit often without a non-cultural control group: one paradigm by Trafimow et al. (1991) asks participants to think about commonalities versus differences between themselves and friends or family; in the other commonly used paradigm developed by Trafimow et al. (1991), participants read a story about a warrior who makes decisions for personal gain or collective benefit; in the sentence unscrambling task, the words contain similar references to individualistic or collectivistic values: "individual," "independent," "self-contained" versus "group," "friendships," "together." It's important to note that although these paradigms were originally developed to activate different cultural selves and generally found evidence that interdependent primes led to more interdependent self views (e.g., Brewer and Gardner, 1996; Trafimow et al., 1991) and collectivistic values (e.g., Gardner et al., 1999; Utz, 2004), subsequent studies have shown that this can have downward consequences for related cultural differences, such as thinking or attentional styles (e.g., both the reflection manipulation about similarities/differences and the pronoun circling task have been shown to shape performance on the Embedded Figures Task, a visual test that measures context dependence— Kuhnen, Hannover & Schubert, 2001).

In contrast, the other commonly used priming technique that targets ethnic culture involves activation of broader cultural values rather than specific norms about the nature of the self: after priming Hong Kong Chinese with cultural icons (American flag, Chinese dragon, Capitol Building, the Great Wall, etc.) versus geometric figures in a control condition, these bicultural individuals made attributions consistent with the culture primed: American icons led to more internal attributions whereas Chinese icons led to more external attributions (Hong et al., 2000). Subsequent studies showed similar effects when Chinese Americans were primed with cultural icons (e.g., Mount Rushmore, Mickey Mouse, a rice farmer; Benet-Martínez et al., 2002).

Along a related vein, primes of the physical environments found in Japan versus the U.S. were also effective in eliciting culturally-bound attention. When Miyamoto et al. (2006) presented both Japanese and European-Americans with photos of street views from medium-sized cities in the U.S. and Japan, they found that both groups were better at detecting changes in the context of an animated scene after seeing the images of Japanese cities compared to the American ones.

The majority of these cultural primes have relied on supraliminal exposure. Less commonly used are subliminal cultural primes. Nevertheless, recent studies have suggested that they work in similar ways. To illustrate, Kimel et al. (2012) flashed affiliation-related or neutral words to European-Americans and found that the subliminal exposure to affiliative words made the participants behave in more interdependent ways—in this case, engage in greater choice justification after making a decision for a close other.

Regardless of the method of exposure, one potential critique of the culture and priming literature is the theoretical (or potentially semantic) issue of whether it is possible to prime a construct as complex as culture. However, although the term "priming culture" may be used loosely, closer examination of these aforementioned studies indicate that in most cases (with the exception of the paradigms involving cultural icons—e.g., Hong et al., 2000), researchers are actually priming specific features of cultural differences–most frequently, self-construal (i.e., independence versus interdependence) or thinking styles (i.e., analytic or holistic). Thus, part of the challenge is to draw appropriate and precise conclusions about what these paradigms can and cannot demonstrate about causality. While one can arguably make the argument that culturally-bound ways of seeing the self and thinking about the world causes differences in cognition, emotion or behavior, it is much more of a leap to posit that culture in general causes these divergences. Yet even in the case of the former, the issue of causality is compounded by the possibility that priming one feature of culture may naturally prime related features of culture—a question that will be revisited in the subsequent discussion on limitations and future/directions.

2.5. Activating ethnic/racial identity

Although the study of cultural study does not frequently intersect with the work on stereotypes, prejudice, and discrimination, it is worthwhile to note that many classic studies of stereotype threat/lift/ reactance involve manipulations that remind the participant of their ethnic or racial identity (not to mention gender identity). For example, when participants are asked to indicate their race (or gender) on a demographic form prior to an academic test (for a recent review, see Spencer et al., 2016), this may be as much of a prime of their social group identity as it is a prime of the stereotypes that apply to members of their group. Although the notion of "culture" (as defined here) is not typically the focus of these studies, it may nevertheless be useful to consider these paradigms as additional ways in which ethnic culture or at least ethnic identification, broadly speaking, can be made salient.

2.6. Interim summary: cultural manipulations related to ethnic differences

Cultural manipulations based on ethnic differences have been widely studied and rely on a substantial corpus of varied techniques that include

manipulations involving highlighting situational cues, explicit direction concerning thinking styles, language of the instruments, and both supraliminal as well as subliminal exposure to cultural concepts. Each category of manipulation is subject to its own set of advantages and limitations. Increasing the saliency of situational considerations appears to be an indirect approach; these findings are suggestive of the notable ways in which cultural differences can be attributable to non-cultural causes (e.g., incentive structures, risk and rewards). Activation of culturally-bound thinking styles most clearly reflect a measurable outcome (e.g., analytic or holistic thinking), but the strength of this manipulation varied across studies and largely depended on the target. In terms of the robustness of the effect, most of the aforementioned studies found significant differences except for Paletz and Peng (2009), who found that only marginal differences emerged on the manipulation check between the dialectical and linear thinking conditions. Moreover, the success of the manipulation depends on the cultural group being targeted: Spina et al. (2010) found that differences emerged between analytic versus holistic conditions but no difference emerged between the analytic and control condition among Canadians, presumably because analytic thinking was already the default, culturally normative thinking style being employed even when no direction was given.

Manipulations involving language and cultural priming appear to be better documented (see Oyserman and Lee, 2007, 2008), but language manipulations, like thinking manipulations, appear to depend on the participant's cultural group—for example, Ji et al. (2004) tested Chinese from China, Taiwan, Hong Kong and Singapore in Chinese and English, but only Chinese from China and Taiwan categorized more relationally in Chinese—or the method of measurement—for example, Mexican-Americans rated themselves as lower in sociability, extraversion, and agreeableness in Spanish than in English (Ramírez-Esparza et al., 2006) but acted more sociably in their actual behavior (Ramírez-Esparza et al., 2009). Although it is beyond the scope of this review to offer a definitive explanation for these findings, it is important to note that priming can lead to both assimilation as well as contrast as a function of how the stimuli are seen (i.e., as similar or not to the target, or from in-groups vs. outgroups—e.g., for a review, see Hall and Crisp, 2008). Moreover, when it comes to self-reported outcomes, the issue of reference group effects is a pervasive confound, particularly in cross-cultural comparisons (e.g., Heine et al., 2002).

3. Class-based manipulations

Manipulations involving class, although more limited, are overall less prone to measurement issues given that all manipulations typically involve a direct social comparison on a concrete outcome (e.g., real or imaginary money and resources); for a full summary, see Table 2. In the same way that most ethnicity-based manipulations involve a cross-cultural comparison between a more interdependent, collectivistic culture (e.g., East-Asian) and European-American culture, virtually all manipulations involving class require a comparison with either a higher or lower class group or person.

3.1. Manipulating subjective vs. objective class or status

The most direct example of this are manipulations targeting subjective social class, where participants are explicitly asked to compare themselves with those at the very top or bottom of a social ladder and imagine interacting with such people (Kraus et al., 2010; Piff et al., 2010). This type of social comparison manipulation has also been used in studies of SES-based stereotype threat: for example, to activate the saliency of SES prior to an exam, participants were told that their exam scores would be compared to either someone much higher or much lower than them in terms of income/education/prestige (John-Henderson et al., 2014).

Alternatively, in manipulations involving objective social class—i.e., in paradigms where there are allocations of actual resources being

Table 2
Summary of common class or status-based manipulations.

Manipulations involving class	Cultural construct	Procedure	Manipulation check/effect of manipulation	Source
Subjective social class	SES	Participants were told to compare themselves with people at the very top or very bottom of the social ladder and describe an interaction with such a person,	Participants ranked their own standing lower in the lower class rank condition, and vice versa for those in the upper class rank condition; those in the lower class conditions showed more empathic accuracy (Kraus et al., 2010) and pro sociality (Piff et al., 2010)	Kraus et al. (2010); Piff et al. (2010)
Objective social class	Social status	Participants were randomly assigned to received the Rolls Royce game piece or shoe piece at the beginning of a game of Monopoly or not. Additionally, high vs. low status condition participants: received $2000 vs. $1000 to start the game, rolled 2 dice vs. 1, collected $200 vs. 100 when passing "Go," and could roll their way out of jail or now.	Participants in the low status condition: had less Monopoly earnings at the end of the game than those in the high status condition; consumed more calories, including more calories from saturated fat and more sodium; reported less pride and powerfulness.	Cardel (2016) using procedures originally developed by Piff et al.
	Social status	Participants played an XBOX volleyball game where they were assigned to win or lose by being in the hardest or easiest difficulty settings.	Participants differed in their percentage of matches won as a function of condition; this experimentally manipulated status also moderated the link between facial width to height ratio and risk-taking	Welker et al. (2015)
	Social status	Participants were assigned many or few points during reaction time task in a group setting	Those assigned more points performed better on the reaction time task than those assigned fewer points.	O'Connell (1980)
Relative social standing	Group status	Participants received false feedback that they were smarter or less	Participants rated the outgroup to be smarter or less smart as a	Doosje, Ellemers & Spears (1995)

Table 2 (*continued*)

Manipulations involving class	Cultural construct	Procedure	Manipulation check/effect of manipulation	Source
		smart than an outgroup	function of the condition; group status influenced subsequent ratings of intragroup variability	
	Group status	Participants were told that a newspaper report said their group had higher status (i.e., related to obtaining full-time jobs) relative to an outgroup	Participants were asked to answer yes/no to the question of whether their in-group was thought as higher/lower status; this subsequently influenced self-esteem changes in response to discrimination	Platow et al. (2005)
	Group status	Participants were told that their ethnic group or an outgroup performed better or worse on an experimental task according to past research, or given no status information	Self-esteem was lower among participants in the low status condition compared to those in the high status and no status conditions	Bohon, Singer & Santos (1993)
Perceptions of status of a target	SES	Male and female photographed targets were shown either in a high status (Bentley) or low status (Ford) car	Male targets in high status cars were rated by women as higher in attractiveness than those in low status cars	Dunn & Searle (2010)

manipulated—the comparisons are more implicit, but still assumed. For example, participants playing Monopoly are assigned either the Rolls Royce or shoe game piece, in addition to being given $2000 versus $1000 to start and collecting $200 versus $100 for passing "Go" and getting to roll the dice to get out of jail or not (Piff, Kraus & Martinez, n.d., as cited in Cardel, 2016). In similar paradigms, participants play other games (e.g., a XBOX volleyball game, a reaction time task) where they are set up to either win/lose or gain many/few points (O'Connell, 1980; Welker, Goetz and Carre, 2015). In still other paradigms, the comparisons are explicit but subjective rather than based on actual resources; here, the construct at hand is always (relative) group status. In these manipulations, participants are told that they themselves or their group was better, smarter, or higher status than an outgroup (e.g., Bohon et al., 1993; Doosje, Ellemers & Spears, 1995; Platow et al., 2005).

It is important to note that across these latter paradigms, the question of whether winning, gaining points, or being told one is superior in status or skill is necessarily a reflection of class is an open one that is subject to interpretation. In the paradigms involving games or game-like tasks (be in Monopoly, a virtual volleyball game, or a reaction time task), it may be more accurate to say that these are, strictly speaking, manipulations of status in general rather than socioeconomic status in particular. Moreover, status in these cases are individualistic or idiocentric ascriptions,

where the level of analyses takes place at the level of the person. In the paradigms involving group superiority or inferiority—where the approach is by definition allocentric—the implication of socioeconomic status is arguably more salient given that the ethnic groups compared almost always diverge socioeconomically, although this feature may not necessarily be explicit. That said, status and SES need not necessarily overlap (e.g., one can be highly respected and famous in a field that does not pay well), and may be confounded with related variables like control; thus, future studies involving such manipulations require careful, nuanced manipulation checks to pinpoint the precise constructs that are being altered.

As a related point, in these group comparisons, further distinctions can be made between SES classes that differ in their actual financial resources (e.g., working versus upper classes, or ethnic groups that are socioeconomically different in the real world—like in the case of Bohon et al., 1993) and social groups that differ in status (e.g., between majors that differ in ascriptions of intelligence—Doosje et al., 1995; universities that differ in perceived prestige or success—Platow et al., 2005). Even though the manipulations across these contexts may look similar (i.e., usually involving being told that one's group was inferior or superior), it is possible that the impact of being told one's ethnic group is better/worse is different than being told one's major or school is better/worse.

3.2. Class-based outcome measures

Regardless of whether it is subjective or objective class and whether comparisons with another person or group is explicit or implicit, all these aforementioned manipulations target participants' perceptions of themselves or their own social group. This, of course, is distinct from the related but distinct body of literature on manipulations of perceived status or class of targets, which oftentimes can rely on similar methods (i.e., exposure to class icons like high or low status cars—Dunn & Searle, 2010) but tap a different psychological construct. Despite the similarity across techniques in manipulating participants' own class, however, the outcomes produced by such manipulations vary widely, including pro-sociality (e.g., opinions about the percentage of one's income that should be donated to charity—Piff et al., 2010), empathic accuracy (e.g., reading the emotional expression of photographed actors—Kraus et al., 2010), food consumption (Cardel, 2016), performance (O'Connell, 1980) and risk-taking (albeit this interacted with other factors—Welker et al., 2015), in addition to general feelings or perceptions about the self and ingroup (e.g., Bohon et al., 1993; Doosje et al., 1995; Platow et al., 2005). Those that have included manipulation checks have consistently found the expected effects in terms of participants' perceptions of their own social standing (e.g., self-reported rankings of their own class or their ingroup's status in cases where the manipulation targeted subjective class—Bohon et al., 1993; Doosje et al., 1995; Kraus et al., 2010; Piff et al., 2010; Platow et al., 2005), and task performance in cases where the manipulation targeted more objective indices of status or rank—for example, by manipulating standing in a laboratory task (e.g., O'Connell, 1980; Welker et al., 2015) or changing one's relative deprivation compared to another group (e.g., Callan et al., 2011; Grant and Brown, 1995; to name a few).

4. Gender-based manipulations

Manipulations involving gender typically fall in three categories: manipulation of gender roles, activation of gender identity salience, and administration of sex hormones. The impact of these vary: while those involving direct administration of sex hormones are direct and measurable, those involving salience of gender roles or identity often entail less clear measures. For a summary, see Table 3.

It is also important to note that the term "gender" typically refers to the sociocultural differences that are often observed between men and women whereas the term "sex" more frequently refers to the more

Table 3
Summary of common manipulations involving gender differences.

Manipulations involving gender differences	Cultural construct	Procedure	Manipulation check/effect of manipulation	Source
Gender roles	Gender role salience	Participants read texts about either progressive or traditional gender roles (i.e., about the feminist movement in decline or in a boom and whether women are living more or less in line with traditional gender roles). In a second study, they focused on the advantages of being a woman (in the traditional gender role condition) or the disadvantages of the traditional gender roles of women.	Those in the progressive condition rated gender roles as having disadvantages compare to those in the traditional condition, but these interacted with gender identity.	Becker & Wagner (2009)
Gender identity	Gender identity salience	Participants report their gender or not before an experimental task	Women who reported their gender were prone to stereotype threat effects	Spencer et al. (1999)
	Gender identity threat	Participants are told they are either the 37th or 83rd percentile on a test about gender-stereotypical topics in relation to other men in the study	Men were asked to report their score on the test (as a manipulation check); this interacted with a sexuality assertion manipulation to influence aggression and sexual prejudice.	Bosson et al., 2012
	Gender identity prime	Participants read about the virtues of being concerned about others and being nurturing (feminine gender identity) vs. being independent and self-sufficient (masculine gender identity), and then wrote about embodying those qualities	Those in the feminine condition rated themselves higher on communal traits while those in the masculine condition rated themselves higher on masculine ones; condition interacted with gender to influence responses to messages about consumer products (Meyers-Levy, 1988)	Meyers-Levy (1988); Winterich et al. (2009)
Sex hormones	Extradiol/ progesterone administration	Menopausal women were administered either estrogen, progesterone, or placebo and given a mental stress test.	Menopausal women showed less cardiovascular stress after being administered estradiol/ progesterone compared to a placebo	Del Rio et al. (1998)
	Testosterone administration	Men were given a gonadotropin releasing hormonee antagonist and then administered testosterone	Men administered testosterone showed more neural activity in threat processing areas of the brain	Goetz et al. (2014)
		Men were administered transdermal testosterone for 180 days using T gel or T patch.	Men administered testosterone showed improvements in mood, lean body mass, and sexual function	Wang et al. (2000)
		Men were given a single dose of Androgel or a control gel; 2D:4D (digit) ratios were also measured	Androgel did not change ratings of or implicit attitudes towards status symbols but did eliminate pre-existing differences based on digit ratio	Wu et al. (2017)
		Same as above	Testosterone concentrations increased 1 h and 2 h after administration; Androgel led to greater utilitarian judgments on certain types of moral dilemmas and less utilitarianism on other types.	Arnocky et al. (2017)
		Men were given a single dose of Androgel or a control gel	Androgen increased actual testosterone and made men less generous in economic games (Zak et al., 2009) as well as more prone to the decoy effect	Liao et al. (2018); Zak et al. (2009)

biologically-based differences between the two; however, others have argued that this may be an arbitrary distinction given that biology and sociocultural influences mutually influence one another (for a review, see Hyde et al., 2019). Given the growing body of evidence suggesting that sex hormones, which were previously assumed to be innate and biological, are actually susceptible to a variety of social and contextual cues (Hyde et al., 2019), these are further reasons to include a discussion of hormonal manipulation in this discussion of experimental paradigms involving gender.

4.1. Activating gender stereotypes

Similar to the previously discussed paradigms involving priming ethnicity or activating culturally-dependent variables, a number of studies have taken a parallel approach with gender by activating gender stereotypes. For example, the gender stereotype activating task by Ortner and Sieverding (2008) involved presenting participants with a vignette about a so-called typical day in the life of a man or a woman that involved engaging in a variety of gender-stereotypical positive behaviors (e.g., caring for others in the case of the woman; being a leader who takes risks in the case of the man); afterwards, participants were also imagined themselves as this person and describe him/her. This manipulation was effective: both men and women performed worse on a mental rotation task after the female prime, whereas the male prime eliminated the gender difference between groups (Ortner and Sieverding, 2008).

Interestingly, other paradigms have managed to elicit the same results without activating gender directly but instead manipulating confidence.

Estes and Felker (2012) found that by simply telling participants that they were either above or below average on visual judgment task involving the length of lines, those in the high confidence condition (i.e., who were told they were above average) performed better on a subsequent mental rotation task compared to those in the low confidence condition. Strikingly, this manipulation also was effective in eliminating gender differences, such that highly confident women performed similar to lowly confident men (Estes and Felker, 2012).

This gender stereotype activation paradigm is similar to the numerous manipulations that have been well-documented by the stereotype threat literature, which have shown similar effects. In the context of spatial reasoning, women primed to think of themselves as students were better at mental rotation than those primed to think of themselves in terms of their gender (or a different, non-stereotype relevant identity; McGlone and Aronson, 2006). This is also consistent with a host of other studies showing that manipulating features of the situation (similar to Yamagishi et al.'s approach to manipulating culture via situational demands) can also activate behavior that are either consistent with or counter to stereotypes (e.g., diagnosticity to the task, the gender of the interviewer—McGlone et al., 2006). Stereotype threat paradigms will also be revisited below in discussion of gender role identity.

4.2. Manipulating gender roles & identity

To illustrate a paradigmatic example of manipulations involving gender roles, Meyers-Levy (1988) subtly manipulated gender role salience by asking participants about their agreement with

stereotypically male—agentic—or female—communal—traits; although this gender role prime interacted with other variables in the study (e.g., self vs. other-oriented messages about a consumer product and self-reported gender), this type of manipulation assumes that activating communal and agentic concerns is equivalent to activating gender roles more broadly. Subsequent studies using the same prime (e.g., Winterich, Mittal & Ross, 2009) found that, as expected, the primes shaped participants' ratings of their own communal and agentic traits and once again interacted with other variables—in this case, moral identity—to shape charitable behavior. Similar to the concerns with manipulations involving ethnic culture, the central issue at hand involves the question of whether activating one feature of this social group membership—like traits involving communion or agency—can be interpreted as activating other features related to being a member of said group.

Moreover, gender role and gender identity may interact: for example, when participants were assigned to read texts that manipulated the types of gender roles described for women (i.e., from a feminist or traditional perspective), the manipulation changed perceptions of gender roles in the anticipated direction, but whether the participants (in this case, women) rejected sexism after reading such passages depended on their own level of gender identification (Becker and Wagner, 2009).

Along a related vein, the large and substantive body of literature on gender stereotypes, particularly stereotype threat, has demonstrated that activating the saliency of stereotypical roles associated with gender may lead to distancing oneself from one's gender identity—a reaction referred to as the "Queen Bee phenomenon" or self-group distancing (e.g., see Derks et al., 2015 for review). Other studies on stereotype threat have further shown that the strength of one's gender identification in the first place can moderate these reactions to stereotype threat (e.g., Schmader, 2002). Moreover, what is considered threatening appears to differ based on the gender at hand: while the studies targeting women being threatened typically involve the aforementioned stereotype threat effects (i.e., manipulations involving reminders of one's gender or the stereotypes associated with one's gender), studies on gender threat among men oftentimes involve descriptions of gender atypicality—for example, being told that one was unlike other men in the study (e.g., Bosson, Weaver, Caswell & Burnaford, 2012). Taken together, these considerations suggest that these subjective manipulations involving gender identity, roles, or threats may be highly complex, subject to a host of possible moderators; their effects may depend largely on the specific gender being targeted, individual differences of the participant's pre-existing attitudes towards their own gender, and other experimental factors.

4.3. Hormone-based manipulations

At first glance, the inclusion of hormonal administration in the examination of cultural manipulations involving gender might seem surprising given that the long-standing assumption is that culture refers to the socially transmitted features of a shared environment rather than the biologically transmitted factors. However, more recent work has highlighted the fact that socio-cultural and biological processes (e.g., genes) interact to produce the observed behavioral differences between populations (e.g., Kim et al., 2010; Kim et al., 2011; Sasaki et al., 2011). Along parallel lines, other studies have demonstrated that the social features of gender (e.g., the distinct emotional lives of men and women) are based in underlying biological systems (e.g., behavioral inhibition versus activation; Ma-Kellams and Wu, 2020). These findings are consistent with the theory of culture-gene coevolution, which has been demonstrated in not only humans, but other species as well (e.g., Lachlan and Slater, 1999). Although genes represent more enduring differences between individuals than hormones, which may be more variable or state-dependent, both represent biological markers than can shift (i.e., be turned on/off in the context of genes, or change in the context of hormones). Thus, manipulations involving biological markers of gender (i.e., sex hormones) are included in the discussion of cultural manipulations

because social and biological factors invariably interact to produce cultural differences. That said, hormonal manipulations do fall under a unique category of "cultural" manipulations in that unlike the other manipulations discussed so far (i.e., involving social group membership in general or specific cultural features in particular, like thinking styles, self-construals, values, roles, relative standing and the like), its basis is biological rather than social in nature.

Unlike the discussion of race/ethnicity and class, gender is also unique as a social group in that it involves biological differences the first place—most notably, those related to sex hormones like testosterone, progesterone, and estrogen. Thus, manipulations involving the administration of such hormones appear to offer a clear-cut way of demonstrating which observed gender differences can be attributed, at least in part, to biological factors and not merely differences in socialization, exposure, norms, and stereotypes. The findings on exogenous hormone administration appear to mirror the substantive body of work on the links between endogenous hormone levels and a host of psychological and physical outcomes, including those related to health (e.g., cardiovascular health—for review, see Vitale et al., 2009), mood and sexuality (e.g., Wang et al., 2000), and threat processing (e.g., Goetz et al., 2014).

It is important to note, however, that not all studies involving hormone administration are true experiments; a few of these studies have relied on pre-post test comparisons of self-selected individuals such as transgender patients undergoing sex hormone treatment (e.g., van Goozen et al., 1995) or post-menopausal women undergoing hormone therapy (e.g., see Vitale et al., 2009). In such cases, hormone administration may be influenced by other related factors like gender identity (for example, in the case of transgender patients and hormone injections).

True experiments involving hormone administrations (e.g., double-blind, placebo control) using Androgel highlight many of the same issues raised previously with manipulations of gender identity or roles, particularly in terms of how experimental manipulations can interact with pre-existing individual differences related to gender. To illustrate, despite the well-established link between testosterone and status seeking, experimental administration of Androgel, compared to a control gel, did not increase men's ratings of, or implicit associations with, status objects (e.g., high status cars), but did interact with prenatal androgen exposure as measured by 2D:4D digit ratios, such that previous differences in implicit status attitudes between men with larger vs. smaller ratios disappeared when Androgel was administered (Wu et al., 2017). However, the studies relying on the same paradigm in a different context—in this case, moral judgments—did find a causal main effect of testosterone administration, with no evidence of it interacting with digit ratio or baseline testosterone (Arnocky et al., 2017). Other experiments using Androgel have also found it to exert the same pattern of effects as endogenous testosterone in correlational studies (e.g., Liao et al., 2018; Zak et al., 2009). Yet a recent large-scale study of exogenous testosterone administration found little effect of the hormone on cognitive reflection, despite previous studies suggesting there was (Knight et al., 2020).

Taken together, these findings on the effects of Androgel administration are generally consistent with the broader idea that the socially-transmitted aspects of culture interact with biological factors linked to group membership. Just as previous work has shown that culture (in the form of self-identified ethnicity) interacts with genes to produce differences in social behaviors like support-seeking and emotion regulation (Kim et al., 2010, 2011), the hormonal administration literature likewise suggests that the biological correlates of sex (e.g., androgens) can, under certain but not all contexts, can interact with pre-existing individual differences to influence behavior.

5. Interim summary: culture, revisited

In reviewing the literature on experimental manipulations involving "culture" in its various forms and contexts, one potential source of tension emerges: how is culture different from any other type of group membership? To be fair, most of the cross-cultural literature is quasi-

experimental insofar as its reliance on self-identified group memberships on the basis of race/ethnicity, class and gender to predict differences in outcomes. Thus, a review of the empirical methods to study culture would suggest that in many contexts, culture and group membership have been used interchangeably. However, as the study of cultural psychology has evolved, so has its methods and models; as a result, the focus of cultural psychological studies has shifted towards pinpointing more precise mechanisms that can explain these observed differences between groups—an evolution that Heine and Norenzayan (2006) described as Stage 1 versus Stage 2. To this end, studies relying on experimental manipulations of culture have increasingly been included in order to elucidate the processes at play in producing cultural differences. After all, groups can differ in a myriad of ways, and not all of these differences are necessarily cultural in nature (an argument that has long been put forth by the "culture as situation cognition" framework (Oyersman and Lee, 2007) and the institutional approach to culture (Yamagishi et al., 2008)). Thus, in order to eliminate the confounds invariably present when making comparisons across groups, cultural manipulations have been used in the attempt to more precisely test the causal link between a specific facet of culture–be it culturally bound situational demands, thinking styles, self-construals, perception of resources or status, identity, or roles—and the outcome at hand.

These attempts, in turn, have not been without their own issues of validity–the most problematic of which centers around the question of whether some of the aforementioned cultural primes are actually priming anything specific or just a general, fuzzy notion of culture and all its potential correlates. This broader methodological (and theoretical) question of what priming paradigms are actually priming is not specific to cultural psychology, but rather, is a recurrent issue in social psychology that highlights the paucity of well-articulated theories about priming's effects and how or why they are achieved (Cesario, 2014). As the commentary on priming effects in the social behavioral sciences illustrate, many priming effects depend on the particular and sometimes idiosyncratic associations individuals have with the specific stimuli used, and as a result, are subject to a host of moderating factors, many of which have to do with culture (for review, see Cesario, 2014).

In summary, the cultural manipulations literature faces both broad, paradigmatic questions about the very definition of culture and specific methodological questions about which facets of culture are being activated in any given manipulation. Below, I highlight several of these limitations and offer potential future directions for subsequent research.

6. Limitations and future directions

6.1. Measurement issues & generalizability

One issue that remains across manipulations is whether manipulating one aspect associated with culture (e.g., individualism-collectivism, language, thinking style, social role, identity, status) necessarily implicates other aspects of culture and therefore can be used to make broader generalizations about enduring cultural differences. This question, of course, is not specific to culture and can be considered in the larger context of whether a temporary state can be used to make inferences about stable features of social group membership. However, this limitation is especially important in the context of culture because culture itself is multi-faceted and complex. As the research on gender identity and threat shows, even related constructs within the realm of social group membership can interact and the same manipulation can lead to divergent outcomes as a function of pre-existing differences (e.g., gender threat leads highly identified versus lowly identified women to respond differently—Becker & Wagner, 2009).

This methodological issue is also tied to the larger question of whether it is even possible to prime one aspect of culture without also priming other, related aspects of culture. This problem is not merely speculative; existing studies have already shown that priming culturally-bound self-construal (e.g., individualism/collectivism, or independence/

interdependence) can influence related constructs like attention (Kühnen et al., 2001). Although this finding confirms the challenges of priming precise and singular cultural concepts in isolation, it is not inconsistent with the theoretical conceptualization of culture, which asserts that culture stands as integrated meaning systems that involve not one, but multiple aspects of the human psyche (Betancourt and Lopez, 1993; Lehman et al., 2004; Rohner, 1984; Triandis, 1993). Nevertheless, to establish more clearly delineated models of cultural priming, future studies should attempt to include more comprehensive manipulation checks to assess the boundary conditions of cultural manipulations. For example, a thinking style manipulation (e.g., for holistic or linear thinking) should involve a subsequent assessment of whether said manipulation influenced not just the way participants processed information, but also their values, self-construals, and identity. Otherwise, it would be difficult to definitively determine whether any observed differences in the outcome measure of interest was the direct product of the thinking style manipulation or other associated facets of culture that were simultaneously activated.

6.2. Appropriate control groups

The question of appropriate control groups applies across manipulations as well. In the context of ethnicity, the most commonly used control group is almost always a feature of (European)-Americans—for example, analytic thinking, independence, American icons, or the English language. While this is a logical and meaningful comparison, it nevertheless reflects a Eurocentric approach (see Heine and Norenzayan, 2006). More nuanced understanding of ethnic culture could result from using additional comparisons with other ethnic groups—for example, in the case of cultural icons, comparing images from multiple cultures, and not just East-West; in the case of activating cultural concepts, using control groups where other culturally-bound schemas are activated (e.g., including thinking primes in a paradigm testing self-construal primes) in order to elucidate the specificity of the effects found.

Similarly, in the context of class, the comparison is typically between high versus low status manipulations, and middle-class or no status is rarely used as a control group, raising questions about whether the effects of class are more driven by high status or low, or both. Including a middle class or moderate status control group could be especially useful in demonstrating whether these effects are driven more by high or low status salience.

Finally, in the context of gender, the nature of the control group varies: while studies involving gender-related threat and hormone administration typically include a true control group where no manipulation is given (e.g., no reminders about one's gender or a placebo), studies involving gender roles or identity usually compare opposing roles or identities (e.g., traditional versus modern gender roles; more or less stereotypical gender ratings); thus, in the latter cases, it is difficult to ascertain the extent to which divergent reactions to the manipulations are driven by cues from one gender or another. Moreover, given the fact that not all individuals identify their gender in binary ways (for review, see Richards et al., 2016), future studies should consider including additional, more inclusive experimental conditions—for example, manipulations that focus on gender fluidity or nonbinary identities. Another alternative control condition could be one that downplays or deconstructs the notion of gender in the first place; doing so would reveal the extent to which any effects are driven by stereotypes about gender.

6.3. Intersectionality

A growing body of literature in psychology has highlighted the reality of intersectionality, or the notion that identities—including the ones related to race, sex, and class—are not separate, but interconnected (for review, see Rosenthal, 2016). Most of the work on intersectionality focuses on the oppression experienced by members of (oftentimes multiple) underrepresented or marginalized groups, and many of such studies have

relied on qualitative (e.g., Thomas et al., 2011) or non-experimental approaches (e.g., Mahalingam et al., 2008; for reviews, see Cole, 2009 and Rosenthal, 2016). Relatively few studies have attempted to tackle intersectionality using true experimental designs, but this represents a potentially fruitful arena for further study. Future work can attempt to manipulate more than one identity or cultural group membership simultaneously to test the precise interactions at play between race, gender and class.

7. Conclusion

Race, gender and class: despite the long-standing assumption that individuals are born into some of these social group memberships (most notably, race and gender; to a lesser degree, class), the psychological manipulation literature reviewed here has demonstrated that it is possible to manipulate each of these constructs. As forms of culture, broadly defined, they each entail defining values, roles, self-construals, thinking styles, and behavior practices that can be targeted in experimental paradigms through techniques like autobiographical reflection, explicit instruction, priming, language, persuasive text, imagery, social comparison, laboratory games, fabricated feedback, and exogenous administration. Despite the breadth of this literature, however, more studies are needed to test the boundary conditions of these manipulations and the extent to which manipulations targeting one feature of cultural group membership necessarily impacts other features. Culture, after all, is more than just how a person thinks or what language they speak, whether they see themselves as independent or interdependent, communal or agentic, high status or low; thus, more evidence is needed to make the epistemic leap that a manipulation which only (temporarily) taps one cultural construct can be construed as changing a person's broader, more stable cultural identity or membership.

Furthermore, culture is also relative, and differences are most salient when comparisons between groups are made. The kinds of control groups employed in the existing literature have largely been limited to a small handful of comparisons: to European/North-Americans, upper class individuals, and to men. Thus, future research should broaden the considerations for what could be considered an "appropriate" control group to go beyond the previously Eurocentric, binary approaches. The world, after all, is large, and the number of social groups, a multitude; experimental designs, therefore, should strive to more accurately reflect the complexity and nuances of the actual group memberships individuals identify with.

Data statement

This is a review paper and thus no original data was collected.

Conflict of interest statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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