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Connecting and Separating Mind-Sets: Culture as Situated Cognition

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People perceive meaningful wholes and later separate out constituent parts (D. Navon, 1977). Yet there are cross-national differences in whether a focal target or integrated whole is first perceived. Rather than construe these differences as fixed, the proposed culture-as-situated-cognition model explains these differences as due to whether a collective or individual mind-set is cued at the moment of observation. Eight studies demonstrated that when cultural mind-set and task demands are congruent, easier tasks are accomplished more quickly and more difficult or time-constrained tasks are accomplished more accurately (Study 1: Koreans, Korean Americans; Study 2: Hong Kong Chinese; Study 3: European- and Asian-heritage Americans; Study 4: Americans; Study: 5 Hong Kong Chinese; Study 6: Americans; Study 7: Norwegians; Study 8: African-, European-, and Asian-heritage Americans). Meta-analyses (d = .34) demonstrated homogeneous effects across geographic place (East–West), racial–ethnic group, task, and sensory mode—differences are cued in the moment. Contrast and separation are salient individual mind-set procedures, resulting in focus on a single target or main point. Assimilation and connection are salient collective mind-set procedures, resulting in focus on multiplicity and integration.

Keywords: culture, individualism, collectivism, independent, interdependent

> Everyone should understand this in this way. This is in the national interest. It is the image of our national music, national culture, especially during the entrance of our national flag. This is an extremely important, extremely serious matter.
>
> —Chinese Olympic Official, quoted in *The New York Times* (Yardley & Yuanxi, 2008, p. A1)

In the opening ceremony of the 2008 Summer Olympic Games in Beijing, China, audiences saw a lovely 9-year-old girl standing alone onstage and heard a beautiful young voice singing a patriotic tune. It was later reported that what appeared to be one girl's performance was really a joint effort. Lin Miaoke stood onstage in a red dress and white shoes while Yang Peiyi was offstage, singing. Together, pretty Lin and clear-toned Yang were the face and voice of China for this important event. While the American press implied that the girls would be harmed by being told that they were not pretty enough or not good enough singers to perform alone, the Chinese political leaders who made the decision saw this as beside the point. In their eyes, the point was that each girl had done her part and together they successfully represented China; this was also the reason given for why all of the 380 hostesses for the Olympics were of the same height and weight (Collins, 2008). While Americans focused first on the girls separately, Chinese focused first on the girls together representing their country.

In the current article, we examine this difference in initial focus of attention. Building on the spirit of earlier work (e.g., Markus & Oyserman, 1989; Woike, 1994), we propose that societies differ in the likelihood that the mind is cued to focus first on separate, decontextualized main points (individual mind-sets) or first on connected, contextualized meaning that emerges from relationships (collective mind-sets). We operationalize mind-sets as cognitive schemas including content, procedures, and goals relevant to separating and decontextualizing or connecting and contextualizing and argue that as a consequence of differing mind-sets, there is a likely average between-society difference in what is perceived as constituting the main point or big picture. While these average effects may appear to be due to fixed differences, in eight studies and a meta-analytic summary, we have demonstrated that they are not fixed but are based on whether a collective or an individual mind-set is made momentarily salient. We show that across societies and members of American racial and ethnic heritage groups, either individual or collective mind-sets can be cued. We also show that cued individual and collective mind-sets have effects of the same magnitude and direction whether in East or West or among Americans from different racial and ethnic backgrounds. To set the stage, we situate our perspective in the broader culture literature.

Operationalizing Culture as Individualism and Collectivism

A main contention of cultural and cross-cultural psychology is that societies differ in their chronic levels of individualism

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and collectivism and that these differences have consequences beyond differences in values (e.g., Inglehart & Oyserman, 2004; Triandis, 1995). Specifically, individualism and collectivism are associated with differences in content of self-concept, ways of engaging others, and cognitive style (for reviews, see Markus & Kitayama, 1991; Nisbett, 2003; Oyserman, Coon, & Kemmelmeier, 2002). We focus explicitly on collectivism and individualism as core axes within the broader and more heterogeneous construct of culture for a number of reasons. First, collectivism and individualism form the cornerstones of a number of central theoretical advances in the growing field of cultural and cross-cultural psychology (for reviews, see Markus & Kitayama, 1991; Nisbett, 2003; Oyserman, Kemmelmeier, & Coon, 2002; Oyserman & Sorensen, 2009; Triandis, 1995). Second, they provide broadly contrasting organizing frameworks for understanding and meaning making. Third, the individualism and collectivism distinction is empirically supported, as we outline below.

Implications of Individualism and Collectivism: Social Knowledge

Cross-national comparisons of countries assumed to differ in individualism and collectivism focus on theoretically associated differences in values, self-concepts, styles of emotional expression, and relationships. With regard to values, essential values of individualism are reported to be individual freedom, personal fulfillment, autonomy, and separation, while, for collectivism, essential values focus on group membership, loyalty, and cohesion (Triandis, 1995). With regard to self-concept, while the self is defined as separate and unique from an individualistic perspective, social roles and relationships are more central to self-concept and more attention is given to the common ground in interactions within collective perspectives (Haberstroh, Oyserman, Schwarz, Kühnen, & Ji, 2002; Markus & Kitayama, 1991; Oyserman, Coon, & Kemmelmeier, 2002; Nisbett, 2003). With regard to emotional style and relationships, individualism is assumed to highlight open expression of emotion and relationships as chosen, voluntary, and changeable, while collectivism is assumed to highlight collectivism, emotional control, and the permanence of relationships based on blood ties and kinship (e.g., Oyserman, Coon, & Kemmelmeier, 2002; Triandis, 1995).

A recent exhaustive review and meta-analytic synthesis of these and other cross-national comparisons supported the notion that cross-national differences are patterned as would be expected if they are linked to individualism and collectivism, thus providing ecological validity for operationalizing culture in terms of collectivism and individualism (Oyserman, Coon, & Kemmelmeier, 2002). This empirical validation is particularly noteworthy because research in this area is widely heterogeneous in samples, methods, and measurement techniques (e.g., Oyserman, Coon, & Kemmelmeier, 2002). One way to think about these results is that they demonstrate some systematic between-society differences in social knowledge, in how people make sense of themselves and the social world. These differences are clearly important. Even more provocative is the possibility that culture may influence basic cognitive processes. There is some supportive evidence for this, as summarized below.

Implications of Individualism and Collectivism: Basic Cognitive Processes

Cross-national comparisons have demonstrated cross-national differences in basic cognitive processes. For example, Americans are faster and more accurate in recall of abstract and central information than Chinese, who are more accurate with details and elements of the whole (Nisbett, 2003). Japanese are more accurate with proportions between elements than Americans, who are more accurate about absolute size (Kitayama, Duffy, Kawamura, & Larsen, 2003). While these comparisons demonstrate that cross-national differences exist, they cannot directly address the proximal source of these differences or how these differences are to be interpreted.

Individualism and Collectivism: Fixed Across Situations or Situationally Malleable?

One possibility is that distal differences in philosophy, religion, language, and history create differences in both cognitive processes (e.g., Nisbett, 2003) and ways of defining the self (e.g., Markus & Kitayama, 1991). This focus on distal differences implies that cultural differences require socialization in the traditions of one's culture and are hence relatively fixed and difficult to change. It also implies that people are socialized in either collectivistic or individualistic traditions and hence can only take on the other perspective through lengthy learning processes, such as those experienced by immigrants.

However, a number of studies have suggested that at least some of these differences are quite malleable and seem easily cued. For example, Ross, Xun, and Wilson (2002) asked Chinese students studying in Canada to describe their values and themselves either in English or in Chinese. The values and self-descriptions of Chinese students differed from the values and self-descriptions of European Canadians when Chinese students provided their responses in Chinese but not when they provided their responses in English. Similarly, Marian and Kaushanskaya (2004) observed that Russian immigrants to the United States reported significantly more memories that focused on the self when randomly assigned to describe their memories in English rather than in Russian. Whether the recalled incident occurred in Russia or the United States, descriptions provided in Russian focused more on context and relationships. Thus, in both studies, random assignment to language condition cued responses that fit either individualism or collectivism.

This malleability is at the core of our theoretical model. We propose that the above-summarized cross-national differences are due not to cross-national difference in whether people have individual or collective mind-sets but rather to cross-national difference in the likelihood that an individual or collective mind-set will be cued at a particular moment in time. Following the situated cognition literature, we term our model a *culture-as-situated-cognition perspective* and suggest that societies socialize individuals to be able to use collective or individual mind-sets depending on context. Which mind-set is cued in the moment depends on the psychologically meaningful features of the immediate situation. In eight studies, we studied this process by priming a mind-set in a controlled setting. However, outside the laboratory, mind-sets should also be cued in context; we return to how this may occur in

the discussion section. Briefly, a situated perspective does not claim that situations carry meaning that is entirely separate from individuals—what is psychologically meaningful is influenced by current goals and momentary affective states.

Culture as Situated Cognition

Our culture-as-situated-cognition model builds on a recurrent theme within social psychology, which is that cognition is situated and pragmatic. The contexts in which one thinks influence both what comes to mind and how it is made sense of. Cognition, according to these models, is contextualized—defined by social context, human artifacts, physical spaces, tasks, and language (Smith & Semin, 2004). Recent key formulations of this theme come from Smith and Semin's (2004, 2007) situated social cognition model, Fiske's (1992) thinking-is-for-doing formulation of the situatedness of social cognition, and Schwarz's (2007) situational sensitivity formulation of the situatedness of cognition. Although they are varied, each of these formulations highlights the constructive nature of cognition and underscores that individuals are sensitive to meaningful features of the environment and adjust thinking and doing to what is contextually relevant (Fiske, 1992).

Taken together, situated approaches make three critical points. First, cognitive processes are context sensitive. This means that psychologically meaningful situations influence cognition; "cognition emerges from moment-by-moment interaction with the environment rather than proceeding in an autonomous, invariant, context-free fashion" (Smith & Semin, 2004, p. 56). Second, this context sensitivity does not depend on conscious awareness of the impact of psychologically meaningful features of situations on cognition (Fiske, 1992; Schwarz, 2007). Third, while the working self-concept is context sensitive (see also Markus & Wurf, 1987), context effects on cognitive processes are not necessarily mediated by self-concept (Smith & Semin, 2004). Thus, how people think about themselves depends on what is relevant in the moment (Markus & Wurf, 1987). However, while situations may cue different ways of thinking about the self, they may also cue content, procedures, and cognitive styles directly (Smith & Semin, 2004).

These three features of a situated social cognition approach are highly relevant to thinking about culture's effects on cognition. Indeed, they are directly convergent with a sociocultural perspective (e.g., Brown, Collins, & Duguid, 1989; Cole, 1996; rooted in Vygotsky, 1962/1986), which also emphasizes the significance of situated action and cognition. Thus, one way to think about cultural difference is to examine psychologically meaningful situations within and across societies. What appear to be stable between-society differences in collective and individual minds may be rooted in differences in exposure to a variety of psychologically meaningful situations.

For example, a number of researchers have examined differences in structure of language (e.g., Y. Kashima, Kashima, Kim, & Gelfand, 2006; Maass, Karasawa, Politi, & Suga, 2006; Stapel & Semin, 2007). Differences studied include whether pronouns can be dropped (E. Kashima & Kashima, 1998). This is more likely in Eastern than Western languages, and E. Kashima and Kashima (1998) suggested that this difference may explain some differences between East and West. They argued that explicit pronouns may focus attention on the individual, whereas implicit pronouns focus attention on context.

A situated approach is not limited to language. To study situational malleability, psychologists have turned to the social cognition literature on priming, which has demonstrated that both content and procedures can be made accessible when subtly cued (e.g., Higgins, 1996; Srull & Wyer, 1979). Accessible content and procedures are used in judgment and decision making. People's interpretation of information depends on the particular knowledge structures (e.g., concepts and schemas) that are active—the same action can be interpreted as dishonest or kind, assertive or aggressive, depending on which of the related concepts is most easily accessible at the time of judgment or information retrieval (Srull & Wyer, 1979, 1980).

Just as content can be primed, so can procedures or ways of problem solving. Priming a cognitive style or mind-set activates a way of thinking or a specific mental procedure (Bargh & Chartrand, 2000). A mind-set can be thought of as a procedural tool kit, heuristic, or naïve theory used to structure thinking. Procedures tell people how to process information to make sense of experience (Schwarz, 2002, 2007). Mind-set priming involves the nonconscious carryover of a previously stored mental procedure to a subsequent task. Of course, priming is only effective if the cued content or procedure is already available in memory. It cannot be effective if the content or procedure that researchers attempt to cue is not available in memory. In this way, priming and contextual cuing build on available knowledge. Next, we summarize the priming literature relevant to individualism and collectivism.

Studying the Malleability of Individualism and Collectivism

A variety of priming techniques have been used to manipulate the temporary accessibility of individualism and collectivism. A recent exhaustive review and meta-analytic synthesis of the individualism and collectivism priming literature (Oyserman & Lee, 2008) suggested that the most common are primes developed by Trafimow, Triandis, and Goto (1991) and Brewer and Gardner (1996). Trafimow and colleagues asked participants to think about ways they were either different from or similar to their family and friends or to read a paragraph describing the choices made by a Sumerian warrior that focused either on choosing a family member or choosing the best person for the task. Brewer and Gardner (see also Gardner, Gabriel, & Lee, 1999) asked participants to read a brief paragraph describing a trip to the city made either alone or with others and to circle either first-person singular or plural pronouns. Oyserman and Lee (2008) also found other, less used alternatives. Alternative individualism primes include the English language (and another language as a prime for collectivism) and participating in or imagining a solo task (and participating in or imagining a group task as a prime for collectivism). Even more infrequent are scrambled sentence primes, other writing tasks, and subliminal word primes.

Taken as a whole, primes differ both in the content they may prime (e.g., similarity and difference in the family and friends prime) and in whether they focus on particular relationships—for example, family and friends. Oyserman and Lee (2008) looked for but did not find differences in effects by prime type or by whether a collectivism prime invoked particular relationships or a more

global collective focus. They addressed the validity of priming manipulations by asking if priming results parallel differences found in cross-national comparisons of difference in social knowledge, particularly values and self-concept (Oyserman & Lee, 2008).

Much of the evidence points to effects of priming individualism and collectivism on salience of relevant, social knowledge. On the one hand, effects of primed individualism and collectivism parallel cross-national comparisons examining content of self-concept (e.g., Gardner, Gabriel, & Dean, 2004; Trafimow, Silverman, Fan, & Law, 1997) and endorsement of individual and collective values (e.g., Gardner et al., 1999). On the other hand, two thirds of individualism and collectivism priming research has focused on Western samples. These studies demonstrate that cross-national differences can be replicated in the West via priming (Oyserman & Lee, 2008).

However, the priming literature is not limited solely to Western samples, and the studies that have used Asian samples produced the same pattern of effects as shown in American, Dutch, and German samples. Thus, Hong Kong students preferred a compromise choice after being primed with collectivism (Briley & Wyer, 2002) and were more likely to explain choice in terms of personal preference after being primed with individualism (Briley & Wyer, 2002). Taken as a whole, these findings indicate that cross-cultural differences in values, self-concept, and social judgments can be reproduced by manipulating the temporary accessibility of individualism and collectivism. This observation is compatible with the assumption that culture influences thought and behavior through social practices that render one or the other way of making sense of the world more accessible.

However, these studies have not yet provided evidence for the more provocative notion that basic cognitive procedures can also be manipulated via temporary accessibility of individualism and collectivism. We address this gap next. In their meta-analytic review, Oyserman and Lee (2008) found only six studies that assessed the impact of culture priming on basic cognitive procedures. All involved German or American participants. We summarize each of these six studies: After priming for individualism, German students performed better at an embedded figures task that required attention to finding a focal object while ignoring irrelevant context (Kühnen, Hannover, & Schubert, 2001, Studies 1, 2, and 4). After priming for collectivism, German students were better at finding missing parts of pictures (Kühnen et al., 2001, Study 3), whereas American students were both faster at seeing spatial relations among objects (Kühnen & Oyserman, 2002, Study 1) and better at remembering relationships among objects (Kühnen & Oyserman, 2002, Study 2).

These interesting results are unfortunately all from Western societies. Because none of the samples are from Eastern societies, we lack adequate evidence to argue that priming individualism and collectivism parallels found differences in cognitive processes between countries. Moreover, though results do show the expected pattern of effects, all of the dependent variables focused on visual perception, and no other mode (e.g., auditory) was tested even though effects on cognitive processes should not be modality specific. Lastly, these studies did not specify when speed should be influenced and when accuracy should be influenced; indeed effects were sometimes for speed (Kühnen et al, 2001, Study 1) and sometimes for accuracy (Kühnen et al, 2001, Studies 2–4; Kühnen & Oyserman, 2002, Studies 1–2). We addressed these gaps in the current studies. We asked first if priming effects on cognitive process were parallel in East and West; second, if priming effects could be found across processing modes; third, if speed–accuracy tradeoffs in priming effects could be found; and last, if effects were meaningful in real-world situations.

The Current Studies

Our culture-as-situated-cognition model predicts that cultural mind-sets influence both content, as demonstrated in the reviewed literature, and process—which we demonstrated in the current studies. We hypothesized that primed cultural mind-set would facilitate performance on cognitive tasks best performed with mind-set-congruent cognitive procedures. We hypothesized similar effects across societies in the East and the West, across sensory modes, and following speed–accuracy tradeoffs, as illustrated in Figure 1. We demonstrated effects of primed cultural mind-set using a pronoun circling task that itself does not include relevant content in the way that priming with words such as *separate* or *connect* could.

We addressed four issues in the following studies. First, we demonstrated parallel effects in Western and Eastern societies, emphasizing Asian cultures that form the basis of the cross-national literature on culture effects (Studies 1–3). Second, we demonstrated effects across a variety of tasks using a variety of sensory modes and well-replicated tasks (e.g., Stroop task; Stroop, 1935; Studies 4–7). Third, we demonstrated systematic speed–accuracy tradeoffs (Dickman & Meyer, 1988; Meyer, Irwin, Osman, & Kounios, 1988; Meyer, Osman, Irwin, & Yantis, 1988) (Studies 4–7). Finally, we demonstrated effects across American racial–ethnic groups on an academic task similar to those commonly found on standardized tests (Study 8). This last study underscores the influence of cued individual and collective mind-sets on nontrivial real-world outcomes. As a final step, we provide a meta-analytic quantitative synthesis.

We used one of the common priming techniques, the pronoun circling task (Gardner et al., 1999), because the content (pronouns) does not directly include terms like *different* or *similar,* which are the processes we believed would be cued. Demonstrating effects on process cued by pronouns rather than semantically relevant words underscores the notion that cultural mind-sets are process infused and are not simply about content. Our use of the pronoun task to study how individual and collective mind-sets influence basic cognition fits the three basic principles of situated cognition—cognition is context sensitive, not dependent on conscious awareness of context, and not necessarily mediated by self-concept (Smith & Semin, 2004). Taken together, Studies 1–8 demonstrate that priming collectivism evokes use of a connecting procedure while priming individualism evokes use of a separating procedure, and this effect is consistent across countries, races–ethnicities, and visual, auditory, and academic tasks.

Because our model focuses on specific directional effects of priming cultural mind-sets, we used one-tailed tests of probability to test the significance of priming cultural mind-sets. We explored moderation by gender and race–ethnicity where these data were available, using two-tailed tests of probability. We followed up with a meta-analytic synthesis using two-tailed tests. For ease of interpretation, when two-tailed tests were used, we have noted this in parentheses.

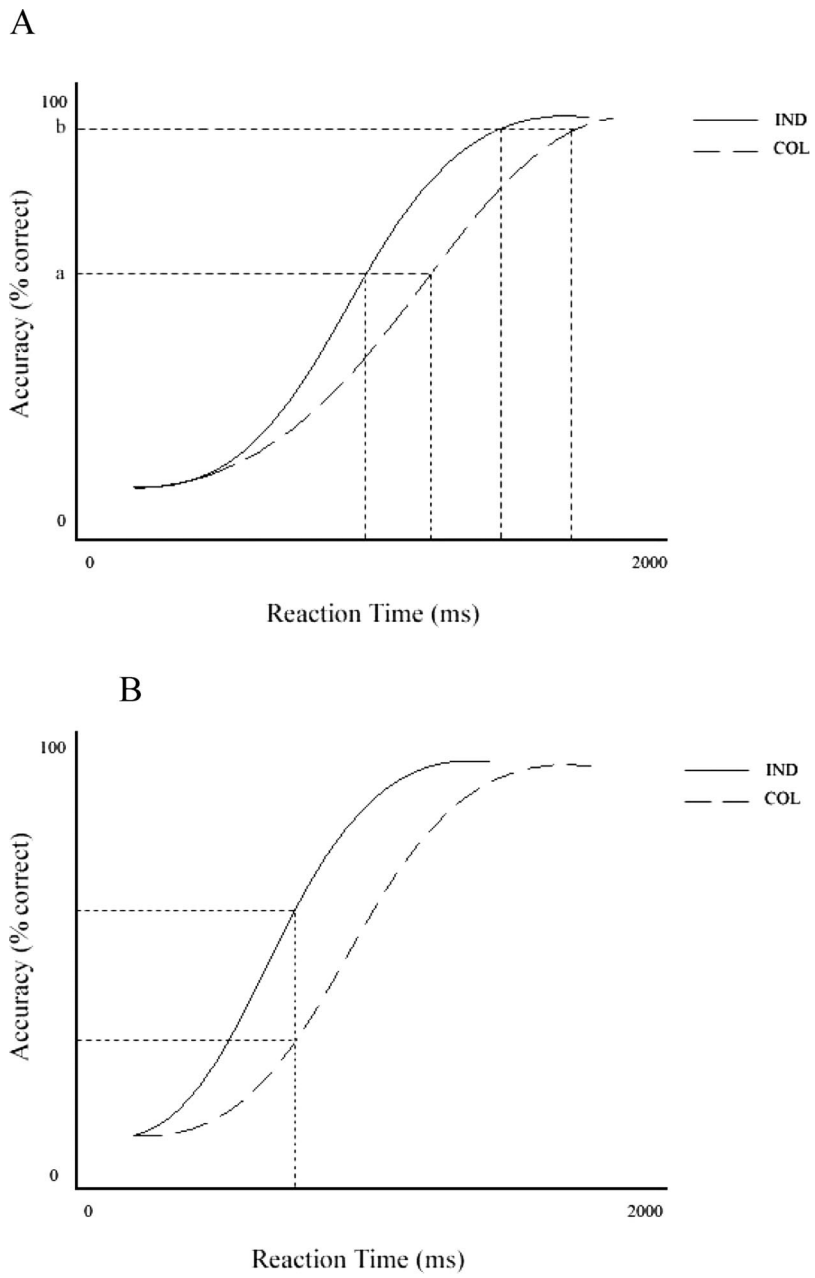

Figure 1. Speed–accuracy tradeoff curves. A: Dashed lines (a, b) represent differences in reaction time at set points of accuracy where Line a represents a difficult task with low accuracy and Line b represents a simple task with high accuracy. B: Dashed lines represent differences in accuracy at a set reaction time. COL = collective mind-set; IND = individual mind-set.

Study 1

In Study 1, our goal was to demonstrate that priming cultural mind-set influences the extent that incidental memory includes connections among objects. We built on the initial demonstration by Kühnen and Oyserman (2002) using European American participants. We used the same task and prime using East Asian (Korean) instead of European American participants. We hypothesized that relative to individual mind-set primed participants, participants primed with collective mind-set would have better incidental memory for spatial detail.

Method

Participants. Adults were asked in Korean to participate in a brief memory study either as they were leaving a Korean-language church service in a midwestern U.S. city (n = 42; 58% female) or as they were leaving class at Seoul National University, Seoul,

Korea (n = 49; gender data were not collected at the participant level, but about 60% of participants were female).

Procedure and measure. Participants were told that they would be briefly shown a picture and then would be asked to report on what they remembered. They were told that to clear their minds, they would be first given a brief language task in which they would be asked to circle all the pronouns they found in a paragraph. A random half in each subset were given a paragraph describing a day in the city with singular pronouns (individual mind-set prime: *I, me, myself*; n = 21 Koreans leaving church, n = 23 Koreans leaving class), and the other half were given the same paragraph with plural pronouns (collective mind-set prime: *we, us, ourselves*; n = 21 Koreans leaving church, n = 26 Koreans leaving class). Each paragraph contained 17 first-person pronouns (singular 나, *na,* or plural 우리, *wuri*). Participants were asked to circle the pronouns they found. The picture and English language version of the pronoun priming task were used by Kühnen and Oyserman (2002). The picture is reproduced in Figure 2, and the pronoun priming task was translated into Korean by a native Korean speaker and examined in back-translation as part of a separate dissertation (Cha, 2006).

The Korean first-person singular *na* is equivalent to the English *I.* The first-person plural *wuri* means *we* but can sometimes be used where the English translation would be first-person singular, especially when used as a possessive determiner. For example, Koreans usually refer to their family as *our family* instead of *my family.* This is also the case in German, which, together with English, is commonly used in priming studies (see Oyserman & Lee, 2008, for a review). Thus, although it is true that *we* in Korean can imply *I* in some cases, in the context of the paragraph used in the priming task, there is no ambiguity as to the meaning of "We go to the city"; it would not be understood as possibly saying, "I go to the city". Therefore, in context, it is reasonable to expect that the priming tasks were equivalent in English, German, and Korean languages.

After circling pronouns, participants were shown a picture with 28 objects (e.g., a sun, a chair) in random array for 90 s. Then, the picture was taken away, and participants were given an empty grid and asked to write down (or draw in) as many of the names of the pictures they had seen as possible, putting the picture in the correct place if they remembered where it had been and otherwise at the bottom of the grid. Following Kühnen and Oyserman (2002), coders counted all correct responses as well as all correct responses also located in the correct place (counted as either in the exact location or off by one grid space).

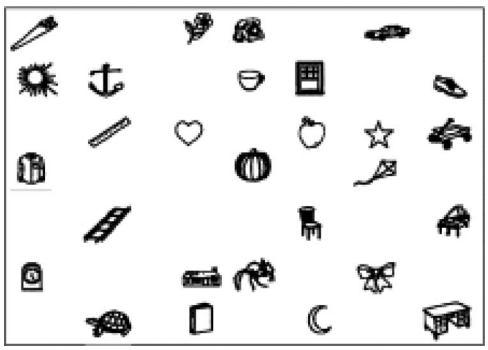

Figure 2. Picture used in Studies 1 and 2. From "Thinking About the Self Influences Thinking in General: Cognitive Consequences of Salient Self-Concept," by U. Kühnen and D. Oyserman, 2002, *Journal of Experimental Social Psychology, 38,* p. 497. Copyright 2002 by Elsevier.

Results and Discussion

This task required paying attention to both individual objects and the relationships between objects in the visual field. Therefore, we predicted that collective mind-set would facilitate accuracy on this task relative to individual mind-set. As predicted, priming collective mind-set (M = 15.74, SD = 8.20) resulted in better memory for location than priming individual mind-set (M = 12.95, SD = 7.48), $F(1, 88) = 2.95$, $p = .04$, controlling for data collection location (church or university). Collective mind-set primed participants outperformed individual mind-set primed participants in recall of items plus their location, indicating that they spontaneously encoded the items in context. Collective mind-set specifically enhanced accuracy of recall for spatial arrangement of the object, not memory in general. The groups did not differ in the total number of items remembered, $F(1, 88) = 0.60$, $p = .11$, just in their ability to recall where objects were located. Collective mind-set priming improved context bound processing, in this case, participant's memory for incidentally encoded context information, presumably because it focused attention on connections among items and the relationship between objects and the field in which they were presented.

These results add to the literature on priming individualism and collectivism in two ways. First, prior studies have not shown an effect of priming individual and collective mind-sets on nonsocial–cognitive processes among Eastern participants (see Oyserman & Lee, 2008, for a review). Second, even when priming studies have included Eastern participants, they typically either have been conducted in English or have used language as a prime, reducing comparability of results in Western samples, which invariably use the participant's home language (for a review, see Oyserman & Lee, 2008). Study 1 demonstrated priming effects in a Korean sample, using Korean language. Difference in contextual memory was found depending on whether individual or collective mind-set was cued. Cued individual and collective mind-sets influenced contextual memory and not memory overall (when contextual information was ignored). This further substantiates our interpretation of the results as based on use of different cognitive procedures. Collective mind-set primed participants did not remember more than individual mind-set primed participants; thus, the results were not simply due to one group of participants slacking off or not trying. Rather, priming collective relative to individual mind-set increased participants' ability to remember contextual information about the items, that is, the location of the item in the field. Effects were found using pronouns as a prime even in a language in which pronouns can be and often are dropped (see E. Kashima & Kashima, 1998). In Study 2, we turned to another country and another language, demonstrating priming effects in Hong Kong.

Study 2

Our goal was to conceptually replicate Study 1 using Hong Kong Chinese participants completing the task in Chinese. As in

Study 1, we hypothesized that participants primed with a collective mind-set would be better able to recall spatial relationships than those primed with an individual mind-set.

Method

Participants. As part of course requirements, Hong Kong University of Science and Technology students ($n = 126$) participated in either a larger, unrelated study ($n = 62$) ending with our task ($n = 31$ individual, $n = 31$ collective) or a brief, stand-alone study ($n = 64$) with only our task ($n = 31$ individual, $n = 33$ collective). Individual-level gender information was not recorded, but we estimate that men and women were about equally represented.

Procedure and measure. Participants were tested in groups of three to five, each participant sitting alone in a cubicle with a computer. As in Study 1, mind-set was primed by circling pronouns in a paragraph. In this case, the paragraph involved a trip to a restaurant. Two English and Cantonese bilingual students did the translation work. One did the translation, Sylvia Xiaohua Chen checked it for flow, and this version was back-translated by a second student. Eighteen personal pronouns were embedded in the paragraph. The character for *we* (我們) is compound and includes the character for *I* (我), suggesting that the meaning is more specifically *my friends and I* rather than simply *we.* Unlike Korean, but like English, in Chinese there is no ambiguity in the meaning of *I* and *we.* The first-person singular is equivalent to the English *I.* The first-person plural is equivalent to *we* and is always plural, even in the possessive, just as in English. Therefore, in context, it is reasonable to expect that the priming tasks were equivalent across language (Chinese and English).

Verbal instructions were in Cantonese. As in Study 1, participants were told that they would be asked to participate in a memory task and that, to clear their mind, they would first perform a brief language task in which they were to circle all the pronouns they found in a paragraph. The paragraph was distributed. Because three to five students participated at a time, to ensure that the 90-s time for presentation was constant across participants, the picture was presented via computer. After circling the pronouns, participants were directed to press the space bar on the computer in front of them. Instructions appeared explaining the task, which was to try to learn the objects that would be presented on the screen once they had read the instructions and again pressed the space bar. After 90 s, the picture disappeared and was replaced by instructions to open the folder next to the computer and follow the instructions in the folder, using the enclosed grid sheet. Instructions were to write in as many of the names of the objects they had seen as possible, in the correct place if they remembered where it was and otherwise at the bottom of the grid. The picture was the same 28-figure array used in Study 1. As in Study 1, coders counted all correct responses as well as all correct responses also located in the correct place (counted as either in the exact location or off by one grid space).

Results and Discussion

We predicted that mind-set prime would influence results such that individual primed participants would be less likely than collective primed participants to spontaneously process the presented stimuli as contextually situated. As predicted, collective primed participants ($M = 11.31$, $SD = 5.26$) outperformed individual primed participants ($M = 9.82$, $SD = 4.28$), $F(1, 123) = 2.98$, $p = .04$, in recall of object plus location, controlling for whether the study was standalone or presented at the end of another unrelated experiment. As found for the Korean participants in Study 1, Hong Kong Chinese participants primed with a collective mind-set outperformed those primed with an individual mind-set in recall of items plus their location, indicating that they spontaneously encoded the items in context. As before, the effect of priming mind-set was specific to context-dependent memory, and priming did not influence overall memory for objects, $F(1, 123) = 0.98$, $p > 1.0$.

Studies 1 and 2 demonstrated that mind-set priming influences context-dependent processing among East Asian participants using the same priming task as previously used with European American participants (Kühnen & Oyserman, 2002, Study 2). Effects were demonstrated with a pronoun prime presented in Korean or Chinese, both languages in which pronouns can routinely be dropped (E. Kashima & Kashima, 1998). Results thus demonstrated that the effect of the prime was the same even when structure of language differed. Using the same dependent variable highlighted consistency but might also be seen as a potential limitation to generalizability. Therefore, to increase generalizability, in Study 3, we tried another dependent variable to ensure that the effect of priming was not due to use of the same dependent variable across studies. Specifically, in Study 3, we focused on the visual arrays used in perception studies to study fast pop-out processing of a target that was slightly different from an array of identical figures in which it was embedded (e.g., Treisman & Gormican, 1988). Study 3 had three aims: to conceptually replicate Studies 1 and 2 using a different visual task, to demonstrate effects of priming on both speed (first task) and accuracy (second task), and to demonstrate effects of priming across tasks. In Studies 1 and 2, the procedural tool suited to the task was cued by priming collective mind-set. In Study 3, we added complexity by using two tasks. The procedure best suited to the first task was ill suited to the second task. The two-task approach allowed us to demonstrate that primed mind-set is used both when it well suits and when it ill suits the task at hand.

Study 3

In Study 3, our goals were to conceptually replicate Studies 1 and 2 with a new sample and dependent measure and to begin to document that once primed, a cultural mind-set will be used even when it is ill suited to the task at hand. To demonstrate this, in Study 3, we used two tasks, the first one facilitated by individual, not collective, mind-set and the second one facilitated by collective, not individual, mind-set. We hypothesized that participants would use the mind-set they were primed to use in both tasks. Specifically, compared to priming a collective mind-set, priming an individual mind-set would improve performance (assessed as latency to correct response) on the individual-mind-set-congruent first task (an easy target identification task) and undermine performance (assessed as increased errors) on the individual-mind-set-incongruent second task (a difficult contextual configuration recall task).

Method

Participants. University of Michigan (Ann Arbor, MI) students ($n = 92$) participated for course credit. They self-identified as European American (male $n = 14$, female $n = 25$) or East Asian American (male $n = 20$, female $n = 33$) and were matched by race–ethnicity with experimenters.

Procedure and measures. Participants were seated alone in cubicles, 60 cm from 16-in. viewable screen monitors placed in the center of their vision. Stimuli from Treisman and Gormican (1988) were presented on E-Prime Version 1.0 (Schneider, Eschman, & Zuccolotto, 2002). The study was described as a visual and cognitive perception study. Participants were told that perception tasks would be interspersed with language tasks to allow the retina to refocus and to facilitate attention. Six participants (1 European American and 5 East Asian Americans) who did not mark any pronouns were discarded (final sample $n = 86$).

Mind-set was again primed with a pronoun circling task. Participants were primed with either individual or collective mind-set and then presented the search and memory tasks and a few demographic questions. After the initial mind-set prime, mind-set prime was maintained by repriming. Four reprimes were presented. One reprime was positioned at the halfway mark of the easy visual task (after 32 trials). The other reprimes occurred at each third of the more difficult 48 trial memory task. Specifically, a second reprime was positioned before the more difficult memory task began. The third reprime was positioned after the first 16 memory trials. The last reprime was positioned after the second 16 memory trials. To reduce suspicion, paragraphs described a day at the farm, a morning sunrise, a day at the beach, a day in the mountains, and an evening sunset in that order. To improve flow, the pronoun task was computerized: Rather than circling pronouns, participants used the mouse to click on each pronoun. Clicked pronouns turned blue.

In the 64-trial search task, participants were asked to press a key labeled with a green sticker if a defined target figure was present and a key labeled with a red sticker if the defined target figure was absent, working as quickly as possible without making mistakes. After each keypress, a fixation point (∗) appeared for 1 s, and then, a new screen appeared. Targets were present 50% of the time (although participants were not provided this information), and each screen contained 12 figures of constant size but differing orientation. We counterbalanced whether a figure was target or background (across screens) and placement of response stickers (across participants). Thus, each figure was paired with another (circles/ellipses, complete/incomplete right angles) and was equally likely to be a target or context figure (see Figure 3 for sample screens). Half of participants had the green sticker on the *f* key and red sticker on the *k* key, and half of participants had the reverse sticker placement.

In the memory task, participants were asked to position the four fingers of their dominant hand on the numbers 1 through 4 on the top of the keyboard and remember what they saw. A 12-figure display (11 identical context figures and 1 unique target figure) was shown for 3 s, then replaced with a four-image choice screen. Participants were to choose as quickly as possible without making mistakes which of the four screens was the one that they had seen before. Choices included the correct choice as well as varied error choices (errors included shift in location of the target figure, shift in size of all figures, and replacement of the target figure with a context figure). Across screens, each figure was equally likely to be a target or context figure. Due to shifting orientation and location of figures, each screen was unique. Between trials, a fixation point (∗) appeared for 1 s.

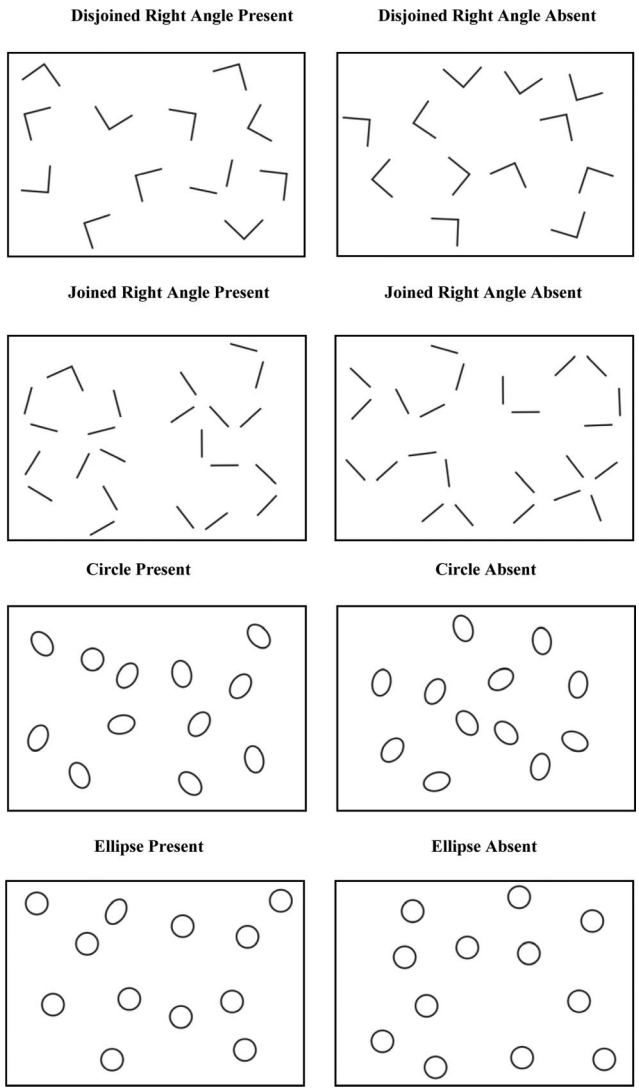

Figure 3. Visual search task: sample stimuli.

The key dependent measures were speed (correct response latency in milliseconds) in the search task and accuracy (percentage correct) in the memory task. To reduce the potential impact of outliers in the search task, latencies longer than 2.5 *SD*s above the mean were replaced with the mean + 2.5 *SD*s (following Barnett & Lewis, 1978; Ratcliff, 1993). Latency was also recorded in the memory task; here, standard deviation in response time was large (range 1,375–5,286 ms) relative to the mean (5,293.24 ms). Therefore, we followed the procedure described by Barnett and Lewis (1978) and Ratcliff (1993) and replaced latencies longer than 2 *SD*s above the mean, rather than 2.5 *SD*s above the mean.

As a manipulation check, we examined the error rate in the search task. Participants were following the instruction to not make

mistakes as 93% made 0–9 errors ($M = 4.56$, $SD = 5.62$) in the 64 trials. Mind-set prime did not affect error rate, $F(1, 84) = 0.65$, $p = .42$.

Results and Discussion

As expected, mind-set priming influenced response latency to correct response in the first (search) task. Individual mind-set primed participants ($M = 1{,}634.29$ ms, $SD = 320.52$ ms) were faster than collective mind-set primed participants ($M = 1{,}800.18$ ms, $SD = 418.02$ ms) at reporting whether a specified target was present or absent, $F(1, 84) = 4.27$ $p < .025$.[1] This effect was consistent whether the target was absent, $F(1, 84) = 3.95$, $p = .025$, or present, $F(1, 84) = 3.19$, $p = .04$. Mind-set priming was not moderated by gender, $F(1, 82) = 0.39$, $p = .53$ (two-tailed), or race–ethnicity, $F(1, 82) = 2.60$, $p = .11$ (two-tailed). The faster speed at recognizing a target evidenced by the individual mind-set primed participants seemed to be due to disregard of the context-bearing whole picture. Thus, in the second (memory) task, individual mind-set primed participants ($M = 39\%$, $SD = 10\%$) were worse than collective mind-set primed participants ($M = 45\%$, $SD = 15\%$) at recalling the exact context-bearing display previously briefly presented, $F(1, 84) = 4.21$, $p < .025$. Mind-set priming was not moderated by gender, $F(1, 82) = 0.01$, $p = .92$ (two-tailed), or race–ethnicity, $F(1, 82) = 0.33$, $p = .57$ (two-tailed). Individual primed participants were more likely to err by choosing a screen in which location of target object was shifted ($M = 19\%$, $SD = 6\%$) than were collective primed participants ($M = 14\%$, $SD = 7\%$) $F(1, 84) = 8.79$, $p < .005$, suggesting that individual mind-set primed participants were less focused on relations among objects than collective mind-set primed participants. Differences in other errors were not found, target object replaced, $F(1, 84) = 0.89$, $p = .175$; size of all objects slightly reduced, $F(1, 84) = 0.05$, $p = .41$, suggesting that errors were systematic and not due to simple carelessness.

An alternative explanation might be that individual priming simply speeds up response latency compared to collective mind-set priming. Though in itself this does not explain the pattern of errors, we examined this possibility in the memory task. Indeed, individual mind-set priming ($M = 4{,}778.97$ ms, $SD = 1{,}914.08$ ms) reduced response latency compared to collective mind-set priming ($M = 5{,}607.99$ ms, $SD = 2{,}002.21$ ms), $F(1, 84) = 3.85$, $p = .025$. However, controlling for response latency, collective and individual mind-set primed participants still differed in their likelihood of choosing the correct screen compared to choosing the screen in which location of the target object shifted, $F(1, 83) = 3.44$, $p < .035$. Taken together, these results support the hypothesized impact of cultural mind-set: The search task was congruent with an individual mind-set while the memory task was more congruent with collective mind-set. Effects of mind-set priming did not differ by gender or racial–ethnic heritage group.

Study 3 increased our confidence in the generalizability of results from Studies 1 and 2 by using a different set of dependent variables and a different sample, clarifying that results were dependent not on a particular task or country (or racial–ethnic heritage) but rather on the match between the procedures that fit the task and the primed mind-set across countries and racial–ethnic heritage. Study 3 also demonstrated effects on both accuracy and speed. However, Study 3 did not systematically examine speed and accuracy effects. We addressed this gap in Studies 4 and 5. We demonstrated effects on speed and accuracy on a well-replicated color Stroop task, first in the United States (Study 4) and then in Hong Kong (Study 5), using a speed–accuracy tradeoff curve to predict effects.

Study 4

Studies 1–3 demonstrated effects of priming individual and collective mind-sets on speed or accuracy but did not systematically manipulate study design to use a speed–accuracy tradeoff curve (Dickman & Meyer, 1988; Meyer, Irwin, et al., 1988; Meyer, Osman, et al., 1988) to predict how cued individual and collective mind-sets would affect task performance. In Study 4, we turned to the speed–accuracy tradeoff. We hypothesized that when the primed mind-set evokes a cognitive procedure that is congruent with the task at hand (the dependent variable in an experiment), then the primed mind-set should facilitate performance. When the focus of a task is maintaining accuracy (e.g., instructions are to work as quickly as possible without making mistakes), effects should be on reaction time. Participants should slow down if necessary to maintain accuracy. To test this hypothesis, we used a classic cognitive interference task, the Stroop (1935) color-recognition task in which participants are presented color-words printed in color-congruent or color-incongruent ink. The color Stroop task requires pulling apart and separating two incoming sources of perceptual information (the printed color from the semantic meaning of the color-words). Therefore, we hypothesized that priming an individual mind-set would speed processing relative to priming a collective mind-set. Because instructions were to work as fast as possible without making mistakes, when the procedure most effective for the task and primed mind-set mismatched, we expected that participants would slow down. Thus, we expected effects on speed, not accuracy.

Method

Participants. University of Michigan undergraduates participated in partial fulfillment of course requirements ($n = 183$; 57 male, 126 female; 109 European American, 21 African American, 29 Asian/Asian American, 4 Hispanic/Latino, 8 multiracial, 12 no race–ethnicity specified).

Procedure and measures. The experiment was described as a language comprehension and voice recognition task. Stimuli were presented using Psyscope 1.0 (1994) on an iMac to participants sitting in a cubicle with a computer, tape recorder, and microphone. Participants were asked to perform a voice check to make sure the tape was working, randomized to priming task, given three practice screens, presented the prime and 48 experimental trials, asked their gender and race–ethnicity, and debriefed.

We used the same computer-administered pronoun task to prime mind-set as in Study 3. To maintain the cover story, participants read the paragraph out loud while clicking on each pronoun in the paragraph with their mouse. The Psyscope program recorded prime and number of pronouns clicked.

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[1] Effects were not dependent on whether target was present or absent, Prime × Present–Absent $F(1, 84) = 2.15$, $p = .15$ (two-tailed).

The Stroop (1935) color-recognition trial screens each contained a word (*blue, red, green,* or *yellow*) printed in either a congruent (24 trials) or an incongruent (24 trials) color; order of congruent and incongruent trials was randomized. Below each word were four color-word click buttons. Participants were instructed to both verbally state and use their mouse to click on the button that corresponded to the printed color of the stimulus word as quickly as possible while maintaining accuracy. Thus, if the stimulus was the word *red* but it appeared in the color green, participants were instructed to say "green" and simultaneously click on the button containing the word *green.* The Psyscope program recorded the color-word presented, the color it was printed in, the color participants clicked, and latency in milliseconds between opening of the screen and mouse click for each of the 48 trials.

We coded for accuracy (percentage of correct responses) and speed of processing for correct responses in the 24 incongruent trials (mean response latency in milliseconds), omitting from each participant's mean score those trials in which time until click was more than 2.5 *SD*s from the mean. Six participants (2 European American, 2 African American, 1 multiracial, 1 no race–ethnicity specified) did not circle any pronouns in the priming task, and 2 participants (1 European American and 1 multiracial) did not understand instructions (all incongruent-trial responses were incorrect). These participants were dropped from analyses (final n = 175 for analyses).

Results and Discussion

We hypothesized that mind-set would influence speed. As expected, response latency was significantly shorter when individual (M = 1,293.00 ms, SD = 212.71 ms) rather than collective mind-set (M = 1,363.61 ms, SD = 329.38ms), $F(1, 173) = 2.79$, $p < .025$, was primed. Priming was not expected to affect accuracy, and it did not, $F(1, 175) = 0.04$, $p = .21$ (individual M = 93%, SD = 18%; collective M = 92%, SD = 19%). The effect of priming on response latency remained when controlling for response accuracy, $F(1, 172) = 3.53$, $p < .02$. Exploratory analyses did not find moderation of priming effects by gender, $F(1, 171) = 0.11$, $p = .74$ (two-tailed), or by race–ethnicity, $F(4, 165) = 0.92$, $p = .45$ (two-tailed).

Study 4 results supported the hypothesis that salient mind-set matters. The Stroop task involves ignoring one source of information while focusing on another source of information. We posited and demonstrated that it would be facilitated by priming an individual rather than a collective mind-set. In Study 5, we expanded on Study 4 in two ways. First, while Study 4 demonstrated that cued cultural mind-set impacts Stroop performance in the West (United States), Study 5 demonstrated these effects in the East (Hong Kong). Second, while Study 4 demonstrated effects on speed of processing with fixed accuracy, Study 5 demonstrated effects on accuracy when speed was fixed.

Study 5

While, in Study 4, we focused on the speed part of the speed–accuracy tradeoff, in Study 5, we focused on accuracy. We used the same Stroop task as in Study 4 with two exceptions. First, participants were Hong Kong Chinese students, and second, we induced time pressure. In Study 5, our goal was to demonstrate that primed cultural mind-set had the same effect in the East as in the West (shown in Study 4) and that, when time pressure was involved, effects of primed mind-set would be seen on accuracy. As before, we hypothesized that when the primed mind-set was congruent with the task at hand, the primed mind-set should facilitate performance.

Method

Participants. Chinese University of Hong Kong Chinese students (n = 236; n = 96 male, n = 137 female, 3 no gender information provided) signed up to participate for an hour of reimbursement at the going student rate of about $6 an hour.

Procedure and measure. To induce the expectation of limited time, participants were told that they would be reimbursed for 1 hr of their time upon completing a series of studies, which required that as they completed each study, they would move on to the next room for a new study. The first study (Study 5), it was emphasized, required both speed and accuracy and that when they finished, they go on to the next study. Participants were placed in small rooms individually and given the same Chinese version of the pronoun priming paragraph used in Study 2 (individual n = 121, collective n = 115). They were then given the same color Stroop task in English as described in Study 4, using E-Prime Version 1.0 (Schneider et al., 2002). Next, participants completed demographic information and were debriefed.

As in Study 4, we coded for accuracy as percentage of correct responses and latency as milliseconds to correct response in the 24 incongruent trials, omitting those trials in which time until click was more than 2.5 *SD*s from the mean.

Results and Discussion

Given time constraints, we expected that effects of mind-set priming would be reflected in differences in accuracy among participants primed with a task-congruent versus a task-incongruent cultural mind-set. Indeed, participants primed with individual mind-set were significantly more accurate (M = 96%, SD = 11%) than those primed with collective mind-set (M = 92%, SD = 21%), $F(1, 234) = 4.16$, $p = .02$. Priming had no significant effect on speed, $F(1, 227) = 0.95$, $p = .17$ (individual M = 1,042.19 ms, SD = 193.99 ms; collective M = 1,067.79 ms, SD = 203.28 ms). The effect of priming mind-set on accuracy remained when controlling for processing speed, $F(1, 226) = 3.35$, $p < .04$. Exploratory analyses did not find moderation of priming effects by gender, $F(1, 229) = 1.77$, $p = .19$ (two-tailed).

An alternative explanation might be that effects were due to use of English language color-words for the Stroop task. Perhaps reading color-words in a second language undermines the cognitive interference resulting from competing sources of information (printed color and semantic meaning) by allowing participants to easily ignore word meaning while focusing all of their attention on printed color. If this were the case, participants would not demonstrate the classic Stroop (1935) finding that processing speed is significantly slower on incongruent trials (printed color and semantic meaning differ—the word *blue* written in red) than on congruent trials (printed color and semantic meaning are the same—the word *blue* written in blue). However, the classic Stroop effect was found. Participants were significantly faster on congru-

ent than incongruent trials, $t(231) = 13.75$, $p < .001$, as would be expected if the classic Stroop effect occurred. This indicates that even though the Stroop task was in English, participants were experiencing interference between the conflicting sources of information (perceptual–printed color and semantic–word meaning). When the color-word and its printed color were incongruent, primed individual mind-set facilitated accuracy relative to collective mind-set. By demonstrating the transfer of a cultural mind-set induced in one language (Chinese) to performance on a task presented in a different language (English), we also showed that individual and collective mind-sets provide general interpretive lenses that transcend the boundaries of a single language.

Taken together, results of Studies 4 and 5 support the hypothesis that salient cultural mind-sets influence thinking in both East and West. Consistent with predictions from a speed–accuracy tradeoff curve, our findings also demonstrated that without time constraint, effects were found for speed (Study 4), while under time constraint, effects were found for accuracy (Study 5). However, Studies 4 and 5 retained a focus on the visual channel, so, to increase confidence in the generalizability of these results, in Studies 6 and 7, we turned to tasks involving another perceptual mode and asked if salient cultural mind-sets influence processing of oral information.

Study 6

In Study 6, our goal was to demonstrate effects of primed cultural mind-set on processing auditory information. Respondents were given an auditory analogue of a color-word Stroop task, a dichotic listening task that required pulling apart two incoming sources of auditory information—syllables presented in one ear from syllables presented in the other ear. Given that there was no time pressure, we hypothesized that when primed, collective mind-set would hamper speed of processing on the dichotic listening task relative to an individual mind-set, with no differences in accuracy.

Method

Participants. University of Michigan undergraduates participated in partial fulfillment of course requirements ($n = 170$; 75 male, 95 female; 129 European American, 14 East Asian/Asian American, 8 African American, 6 Hispanic/Latino, 2 Indian [not otherwise specified], 6 multiracial, 5 other).

Procedure and measures. The experiment was described as being about language comprehension and listening. Stimuli were presented using E-Prime Version 1.0 (Schneider et al., 2002) to participants sitting in a cubicle with a computer, headphones, tape recorder, and microphone. As before, participants were set up, asked to perform a voice check, randomized to prime condition, and completed the experimental listening task. The priming task was the same pronoun paragraph task used in Study 4. The listening task was developed by Hugdahl (1988, 2003).

To maintain priming over time, the prime-listening task sequence was repeated so that participants were primed before each of three 36-trial listening tasks. In each listening task, participants heard one of the syllables *ba, da, ga, pa, ta,* and *ka* and were asked to repeat the syllable out loud while pressing on the number key (1–6) shown on screen as corresponding to the syllable heard. They were asked to work as quickly as they could without losing accuracy. To avoid suspicion, the priming paragraphs were modified so that one paragraph described a day in the city, another described a day in the country, and a third described a day at the beach. The specific priming paragraph used was counterbalanced with listening task, so observed effects of priming mind-set cannot be attributed to the effect of a particular priming paragraph.

The first task was a practice task. Participants were instructed to say aloud and press the number key of a syllable that they heard. The second 2 tasks were the experimental tasks. These were presented in randomized order. In one task, participants were told to ignore information from the right ear and respond only to what they heard in the left ear. In the other task, they were told to ignore information from the left ear and respond only to what they heard in the right ear. Half of the participants first focused on the right ear, and half of the participants first focused on the left ear. Each task included 30 critical trials. In these trials, different syllables were presented to the right and left ears. Six trials in which the same syllable was presented to both ears were interspersed among the critical trials. The E-prime program recorded the syllable presented in each ear, the number pressed on the keyboard, the correct response, and latency (milliseconds between the end of each auditory stimulus and the participant's button press on the keyboard). After completing the listening tasks, participants were asked their gender and race–ethnicity and were debriefed.

Following Bryden (1988), correct responses and latency to correct responses for each ear were obtained from the 30 critical trials in which different information was presented to the right and left ears. Accuracy (percentage correct) and latency were assessed separately for each ear. To control for individual processing speed difference, latency analyses controlled for mean latency on the nonexperimental practice task. Any trial in which time to click was more than 2 *SD*s from the mean was omitted from the participant latency calculation. Left and right ears were analyzed together and separately to take into account the right-ear advantage, that is, improved accuracy when listening with the right rather than the left ear (due to language lateralization in the brain, independent of handedness; see Bryden, 1988). Four European American participants who did not mark any pronouns were dropped from analyses (final sample $n = 166$).

Results and Discussion

Respondents were not under time pressure and the task was hard, so we expected effects on response latency. The task required ignoring one source of information (sounds heard by the nontarget ear) and focusing only on another source of information (sounds heard by the target ear), so we expected that priming individual mind-set would facilitate performance relative to priming collective mind-set. Indeed, repeated measures analyses of variance supported our hypotheses. First, with regard to speed, individual mind-set priming reduced response latency relative to collective mind-set priming, $F(1, 163) = 2.59$, $p < .03$. Second, with regard to accuracy, accuracy for right (54%) and left (37.5%) ears is comparable to accuracy reported in the original manual (right-ear accuracy, 51%; left-ear accuracy, 41%, see Hugdahl, 2003) and was not influenced by priming, across ears, $F(1, 164) = 0.01$, $p = .23$ (individual $M = 46\%$, $SD = 11\%$; collective $M = 46\%$, $SD = 10\%$).

The effect of priming on response latency was robust and remained significant even when controlling for accuracy, $F(1, 162) = 2.57$, $p < .03$. Exploratory analyses did not find moderation of priming effects by gender, $F(1, 161) = 0.02$, $p = .90$ (two-tailed), or race–ethnicity, $F(2, 159) = 0.03$, $p = .97$ (two-tailed). Latency effects were consistent across various summary techniques. Effects were significant when average latency across right and left ears was used (individual $M = 1{,}648.77$ ms, $SD = 355.52$ ms; collective $M = 1{,}720.82$ ms, $SD = 357.10$ ms), $F(1, 163) = 2.59$, $p < .03$, as well as when only right-ear responses were used, $F(1, 163) = 3.11$, $p = .02$; though marginally significant, they were in the same direction when only left-ear responses were used, $F(1, 163) = 1.36$, $p = .065$.

Priming an individual or collective mind-set, if congruent with the demands of task, can facilitate speed of performance when, as in Study 4, the task is simple and time is not constrained and when, as in Study 6, the task is relatively hard (accuracy was about 50%). In both cases, priming a congruent mind-set facilitates more rapid responses without compromising accuracy. To demonstrate speed–accuracy tradeoff, in Study 7, we introduced time constraint and predicted a shift in accuracy when cued mind-set was incongruent with task demands. To further increase generalizablity of results, we also utilized participants from Norway, a country not currently part of the published culture priming literature (see Oyserman & Lee, 2008, for a review).

Study 7

Our goal in Study 7 was to conceptually replicate Study 6 using a different sample and inducing time pressure to examine effects on accuracy. We created time pressure by having participants first practice the task under a difficult time constraint—they were to be twice as fast as the average participant in Study 6. Because the task required ignoring some information while paying attention to other information, priming individual mind-set was predicted to facilitate task completion. Under time pressure, we hypothesized that primed collective mind-set would hamper accuracy on the dichotic listening task relative to individual mind-set.

Method

Participants. University of Bergen (Bergen, Norway) native Norwegian-speaking undergraduates received token payment (about $5) for their time ($n = 126$; 37 male, 87 female, 2 not specified; race–ethnicity not asked).

Procedure and measure. The procedure was identical to Study 6 except that priming materials were translated into Norwegian and administered via paper and pencil. In Norwegian, the singular pronoun *I* (*jeg*) and the plural pronoun *we* (*vi*) serve the same function as they do in English. To facilitate speed, participants were asked to press the relevant key but not to repeat the syllable out loud. Assigned keys were labeled with the written syllable assigned to the respective key. Keys used were on the left side (|, 1, and 2) and the right side (/, *, and -) of the Norwegian keyboard.

Prior to priming, participants practiced rapid response until their speed was under half the speed averaged in Study 6. Specifically, 22 practice trials were presented in four phases where congruent syllables were played into each ear. Instructions were to react within a set time, starting with a generous 3,000 ms (four trials) that was reduced to 2,500 ms (two trials). Then, participants were told to work faster. Time criteria was set at 1,000 ms (four trials), then reduced to 700 ms (12 trials). At each phase, respondents had to repeat trials to attain time criteria as needed. In total, across the phases, participants on average required six ($M = 6.30$, $SD = 3.00$) more trials to reach criterion speed. Given the focus on speed, response was blocked in the first 250 ms to prevent premature responses (see Meyer, Osman, et al., 1988). Piloting showed that the 700-ms time criterion was challenging but possible to achieve with practice for all participants.

Analyses ($n = 114$ native Norwegian speakers; 33 male, 80 female, 1 not specified) excluded 6 participants due to documentation error and 6 participants who failed to mark any pronoun in any of the three priming tasks.

Results and Discussion

We hypothesized that the dichotic listening task would be harder when collective mind-set was primed relative to individual mind-set, resulting in improved accuracy for individual mind-set primed participants under time pressure. Indeed, in the critical incongruent trials, priming improved accuracy for individual mind-set (68.5%) relative to collective mind-set (60%) participants, repeated measures analysis of variance, $F(1, 112) = 10.92$, $p < .001$. Participants were more accurate when individual rather than collective mind-set was primed in both right-ear (74% vs. 65%), $F(1, 112) = 9.01$, $p < .001$, and left-ear (63% vs. 55%), $F(1, 112) = 5.67$, $p < .005$, trials. As expected, time pressure meant that priming did not affect latency, which averaged 926 ms, prime repeated measures main effect, $F(1, 111) = 0.17$, $p = .17$; right and left ears, Fs < 1. Controlling for latency, the effect of the prime on accuracy remained, $F(1, 111) = 10.59$, $p < .001$. Exploratory analyses did not find moderation of priming effects by gender, $F(1, 109) = 1.77$, $p = .19$ (two-tailed). Priming mind-set congruent to task demands improved accuracy when speed was fixed.

Studies 1–7 demonstrated effects of priming congruent and incongruent mind-sets across East and West and across tasks and modalities. These studies also demonstrated a systematic shift in speed–accuracy tradeoffs. What they did not do was demonstrate that match or mismatch between primed cultural (individual or collective) mind-set and the most effective mind-set of the task at hand matters in the real world. We began to address this issue in Study 8. We also addressed two additional potential limitations of Studies 1–7. First, Study 8 moved beyond simple East–West comparisons to include African Americans as well as Asian Americans and European Americans. Second, while Studies 1–7 showed that individual and collective mind-set priming produced different effects, they could not conclude whether both primes shifted cognitive procedure equally. To begin to address this issue, Study 8 included a control group so that impact of each mind-set prime could be compared.

Study 8

In Studies 1–7, our goal was to demonstrate that primed cultural mind-set has significant consequences in cognitive tasks independent of the content of the mind-set prime. Having demonstrated effects for visual and auditory tasks, our goal in Study 8 was to demonstrate that primed cultural mind-set matters—that match of salient cultural mind-set to task demands has real-world consequences. We focused on

standardized test taking in the academic context, using as our model tests like the Graduate Record Exam (GRE).

These tests are complex because test takers must choose a single best answer from among multiple similar but incorrect choices that also demonstrate connections to a broader underlying construct. For this reason, the relevant cognitive procedure is not to connect and relate—all of the answers are written to have some relevance—but rather to separate and pull apart a best answer from the others. To test our hypothesis, we used two verbal tasks, an antonym task and an analogy task, presented in randomized order. While the focus on opposites in the antonym task may make it seem superficially more congruent with procedures cued by an individual mind-set, we expected the same pattern of effects in the analogy task as well, for the following reason: Even though analogies involve things that go together, the goal of the task was not to create or see an analogy but to find the best match and ignore other plausible but not as good matches. A collective mind-set was assumed to increase the extent that participants could see both differences and similarities among all the choices, reducing their ability to choose a single best answer while ignoring the rest. Thus, we hypothesized that compared to individual mind-set primed participants; participants primed with collective mind-set would perform worse at the GRE task. In this way, our reasoning is consistent with cross-national research demonstrating greater comfort with contradiction and multiplicity in Eastern than Western cultures (Nisbett, Peng, Choi, & Norenzayan, 2001; see also Nisbett, 2003). By including a no-prime control, we were able to explore whether the mind-set prime effects were equally powerful across racial–ethnic groups and whether the control participants were midway between collective and individual mind-set or the testing situation effectively cued an individual mind-set among control group participants. The task was difficult, so we expected effects on accuracy; slowing down would not increase accuracy.

Method

Participants. European American ($n = 132$; 54 male, 78 female), Asian American ($n = 87$; 36 male, 50 female, 1 no gender specified) and African American ($n = 31$; 10 male, 21 female) University of Michigan students participated in partial fulfillment of course requirements. They were prescreened for self-identified race–ethnicity and English fluency.

Procedure and measures. Participants worked alone in a cubicle on a study described as entailing a series of reading and verbal comprehension tasks. Experimenter and participant race–ethnicity were matched, and all instructions, stimuli, and dependent measures were presented with E-Prime Version 1.0 (Schneider et al., 2002). Following random assignment to condition (individual, collective, or no-mind-set-prime control), participants were primed and given two verbal GRE tasks (antonyms and analogies). To control for order effects, order of task presentation was randomized across participants. Between tasks, participants were reprimed, keeping prime condition constant. The prime was presented on computer. One priming paragraph described a day at the amusement park, and the other described a day in the mountains.

The verbal GRE task involved 17 multiple choices, seven order-randomized antonyms, and 10 order-randomized analogies taken from GRE practice exams and pilot tested to ensure that they were of moderate difficulty. In each case, participants were asked to choose the single best choice. They were provided two practice trials prior to priming and could repeat practice trials as many times as they desired before proceeding.

Each problem consisted of a word followed by five numbered words or word-pairs. Participants used the keyboard to enter a number from 1 to 5 to indicate their response choice. In the antonym section, instructions were to choose the word whose meaning was most nearly opposite that of the target word. In the analogy section, instructions were to choose the word-pair whose semantic relationship most closely resembled that of the target word-pair. Both mean latency to correct response in milliseconds (omitting trials with response times over 2 *SD*s from the mean) and mean accuracy (percentage correct) were assessed. Reaction time data were normally distributed, so log transformation was unnecessary. Participants (4 European American, 3 Asian American, 1 African American) who did not mark any pronouns on the priming tasks were dropped from analyses (final sample $n = 242$).

Results and Discussion

We tested the hypothesized undermining effect of the collective mind-set prime on participant GRE performance (accuracy) using a repeated measures analysis of variance, including both antonym accuracy and analogy accuracy as within-person measures. Results supported our hypothesis. Specifically, mind-set priming significantly influenced accuracy, $F(2, 239) = 5.32$, $p < .01$, not speed, $F(2, 239) = 0.80$, $p = .23$ (individual $M = 15{,}691.71$ ms, $SD = 5{,}975.18$ ms; collective $M = 15{,}323.40$ ms, $SD = 5{,}785.71$ ms; control $M = 14{,}812.83$ ms, $SD = 5{,}445.41$ ms). Participants primed with a collective mind-set ($M = 51\%$, $SD = 22\%$) were less accurate than participants primed with an individual mind-set ($p < .01$, $M = 61\%$, $SD = 19\%$) and also less accurate than control participants who were not primed ($p < .05$, $M = 57\%$, $SD = 17\%$). While in the expected direction, participants primed with an individual mind-set did not significantly outperform control participants ($p = .12$). The effect of priming cultural mind-set on accuracy was not moderated by race–ethnicity, $F(4, 233) = 0.05$, $p = .99$, or gender, $F(2, 235) = 0.94$, $p = .39$.

When cultural mind-set and procedure suited to the task were mismatched, accuracy dropped 10%. These results suggest that performance on important real-world academic tasks is significantly affected by salient cultural mind-set. Performance is undermined when salient cultural mind-set is incongruent with the procedures needed for the task at hand, and these effects are not simply of theoretical importance—they can also result in meaningful differences in performance.

American-style GRE test taking is likely to be undermined in situations that cue collective mind-set relative to situations that cue individual mind-set. The addition of a control group in this study importantly highlights that individual and collective mind-sets are not fixed but are responsive to environmental cues. Indeed, the nonsignificant difference between individual mind-set and control condition participants suggests that in the control condition, the task itself cued an individual mind-set (regardless of race or cultural background). Among control participants, task accuracy did not differ by race–ethnicity, $F(2, 78) = 1.51$, $p = .23$ (all contrasts were nonsignificant). Thus, our findings do not suggest that members of collectivistic cultures are likely to perform worse

on standardized multiple-choice tests relative to members of individualistic cultures but rather that when mind-set and procedure mismatch, performance suffers. In the case of a multiple-choice task, it seems that the cued mind-set is an individual mind-set unless something else in the context cues a collective mind-set. We return to this issue in the General Discussion. Together with Studies 1–7, results from Study 8 provide consistent support for our model of culture as situated cognition. However, only a quantitative synthesis of the studies could provide a clear synopsis of effects and provide evidence of homogeneity across these potential moderators. Therefore, we conducted a meta-analysis.

Meta-Analysis

To examine the robustness of effects of cultural mind-set priming, we conducted a meta-analysis of the effects of priming individual or collective mind-set across Studies 1–8. Effects were not heterogeneous, $Q(7) = 4.86$, $p = .68$, indicating that a fixed-effects analysis was appropriate. A fixed-effects analysis revealed a significant, robust effect across studies, $d = .34$, 95% confidence interval (.22, .45), $z = 5.73$, $p < .001$. A sensitivity analysis (examining the overall effect across studies and with each study singularly removed) indicated that the overall effect of priming cultural mind-set is not contingent on any single study (see Table 1). Thus, results demonstrate that the effect of priming cultural mind-set is robust across method, sample, and dependent variable. Effects were parallel across countries (China, Korea, Norway, the United States), across American ethnic and racial groups, and across sensory mode and task.

General Discussion

We began by contrasting American and Chinese popular response to press reports that what the audience saw and heard at the opening ceremony of the 2008 Summer Olympics was not a single young Chinese girl standing alone onstage singing beautifully but the joint efforts of one Chinese girl onstage and another offstage, providing the voice. Americans focused on the girls separately and their personal feelings. Chinese focused on the girls together and their country's feelings. We argued that this difference in what was immediately processed was due to cultural mind-set and proposed that even though Americans first focused on each girl separately (an individual mind-set), they could focus on the meaning of their merged identity for the country (a collective mind-set) when cued to do so, and that the same was also true for Chinese. Though Chinese officials first focused on the emergent meaning resulting from the girls together representing the country, they could see the alternative perspective when cued to do so. What differed for Chinese and American audiences was what was psychologically salient about the context. To understand how it might be that Chinese and Americans tended to see the situation differently but could see the situation through the alternate meaning-making lens of the other society, we suggested a culture-as-situated-cognition model.

This model draws from the basic insight that how people think depends on the pragmatic imperatives of the context. As first noted by William James (1890/1983), thinking is for doing. "My thinking is first and last and always for the sake of my doing" (James, 1890/1983, p. 960). Rather than conceptualize culture as producing fixed and largely immutable patterned ways of thinking and of organizing the social world, a situated model allows for the possibility that culturally tuned mind-sets are largely malleable and sensitive to immediate contextual cues.

We operationalized mind-sets as cognitive schemas including content, procedures, and goals relevant to separating and decontextualizing or connecting and contextualizing. When a cultural mind-set is cued, so are the relevant goals, procedures, and content. Because societies differ in their pragmatic imperatives, it is likely that cultures differ in which mind-set is chronically accessible. Chronic between-society differences are likely importantly due to which mind-set is chronically accessible, suggesting that what appear to be fixed between-society differences are better understood as malleable differences in whether an individual or a collective mind-set is cued. We predicted and found that accuracy and speed improve when the salient cultural mind-set is congruent with the task at hand and that the salient cultural mind-set is likely to be used even when it is incongruent with

Table 1
Meta Analyses: Sensitivity Analyses Statistics and Confidence Interval (With Each Study Removed)

			Effect with study removed		
Study	Sample country	Dependent variable	Effect size (*d*)	95% confidence interval	*Z* score
1	Korea	Visual memory	.34	.22, .46	5.48
2	Hong Kong	Visual memory	.34	.22, .47	5.47
3	U.S.A. (Asian American, European American)	Visual search and memory	.33	.21, .45	5.38
4	U.S.A. (diverse)	Color Stroop	.35	.23, .48	5.51
5	Hong Kong	Color Stroop	.36	.24, .50	5.50
6	U.S.A. (diverse)	Dichotic listening	.36	.24, .49	5.66
7	Norway	Dichotic listening	.31	.19, .45	5.01
8	U.S.A. (African American, Asian American, European American)	Graduate Record Examination	.31	.19, .45	4.90
Average effect across studies			.34	.21, .46	5.73

Note. ps $< .001$. Range = lower to upper limit; Variance = .004; $SE = .06$, except for Study 5, where $SE = .07$.

the task at hand. The meta-analyses suggested that effects were not heterogeneous across the studies and that the average effect was not dependent on any one particular result.

Our results also fill in three key gaps in the individualism and collectivism priming literature—studies using priming techniques to replicate known cross-national differences (Oyserman & Lee, 2008). This literature is dominated by studies conducted in Western countries and focuses mostly on social knowledge (values, self-concept, relationality). Less is known about effects of priming on basic cognitive procedures. Even the few prior studies that did focus on basic cognitive processes (Kühnen et al., 2001; Kühnen & Oyserman, 2002) were framed just as self-concept effects because they only included participants from Western countries assumed high in individualism. Prior studies have not allowed direct comparison of results of priming in East and West because priming techniques differed by sample source. Addressing these gaps is important—without a replication in the East, it is difficult to argue that effects found only in Western samples are due to culture at all, and without a broad focus on cognitive procedures using well-studied tasks, it is difficult to argue that culture is the active ingredient in between-society differences in cognition.[2]

To address these gaps and provide evidence for our culture-as-situated-cognition model, we systematically replicated effects in the East (Hong Kong and Korea) and the West (Norway and the United States) and demonstrated stability of effects across American racial and ethnic groups (African Americans, Asian Americans, and European Americans). We demonstrated effects on visual and auditory processing and in a GRE-type task. We predicted speed–accuracy tradeoffs. We always used native language, so that effects were not contingent on a particular language. We chose a priming task that fit the assumptions of a situated cognition model, was easy to translate, and could be produced in numerous forms so that participants could be reprimed without suspicion.[3] By showing that effects occurred with a prime that did not directly cue any particular cognitive procedure, we demonstrated an effect of cultural mind-set—a cognitive schema including goals, content, and procedures focusing on connecting or separating. Showing that people process auditory or visual stimuli for connections after being directly primed to focus on connections by thinking of their similarities to friends and family would have been interesting but would not have implicated a more general cultural mind-set. Showing that circling the words *we, our,* and *us* produced these effects implies that what was activated was a cultural mind-set to connect, since the words themselves do not directly implicate the cognitive procedures studied.

Potential Alternative Explanations and Limitations

Social facilitation. A number of alternative explanations might be proposed. At first glance, it might seem that our findings were due to social facilitation rather than to cultural mind-set. That is, the first-person plural pronouns used in the collective mind-set prime may bring to mind the presence of others. Might social facilitation explain our results? Zajonc (1965) demonstrated that the presence of others enhances dominant responses and inhibits nondominant responses. Prior to attaining mastery, the dominant response is likely to be an erroneous response, while, after attaining mastery, the dominant response is likely to be the correct response. The presence of others during practice should increase the time needed to master a task, but once mastery has been achieved, the presence of others should facilitate performance (Zajonc, 1965).[4] From a social facilitation perspective, collective mind-set primed participants should be faster at the dominant response. In easy tasks (e.g., Stroop Studies 4 and 5), this would be the correct response. In harder tasks (e.g., the unpracticed dichotic listening task in Study 6 or the GRE in Study 8) this would be an error until mastery is attained (e.g., the practiced dichotic listening task in Study 7). Taken together, results do not support a social facilitation interpretation. Collectivism priming did not improve response on easy tasks (the Stroop) or practiced tasks (the practiced version of the dichotic listening task). Moreover, after practice, participants were considerably more accurate and faster than before practice. Taken together, results rule out social facilitation as an alternative explanation.

Global processing always precedes local processing. Another possible interpretation follows from Navon's (1977) argument that global, gestalt, or big-picture processing always precedes local, detail, small-picture processing. While results from prior studies (e.g., Kühnen et al., 2001; Kühnen & Oyserman, 2002) demonstrating effects of individual and collective priming could be reconceptualized in terms of global versus local processing, the argument that global processing always precedes local processing is not a helpful interpretation of our results. Rather, we find that what constitutes the meaningful whole seems dependent at least in part on whether an individual or a collective mind-set has been cued. What we have shown in our priming studies is that priming cultural mind-set can influence speed—slowing down response times when the primed cultural mind-set is at odds with the task at hand and speeding up response times and making the task less error-prone when the task is more fluent because the at-hand procedure fits the task. We do not intend these results to suggest that collective mind-sets slow processing speed or capacity in general; instead, we assume that the observed effect is a function of the (mis)match between task requirements and the procedures that are part of the primed cultural mind-set (see Higgins, Idson, Freitas, Spiegel, & Molden, 2003, for a parallel discussion of effects of match or mismatch of self-regulatory focus).

Are effects due to collective mind-set, individual mind-set, or both? A limitation of our results is that we cannot fully address whether cross-national effects can be attributed to individual mind-set, collective mind-set, or both. Although experimental manipulation and comparison to a control group is a common experimental solution to this problem, as noted by, among others, Oyserman and Lee (2008),

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[2] Indeed, when researchers study only the West, they typically are careful to talk about their effects mostly in terms of self-concept (e.g., Brewer & Gardner, 1996; Stapel & Koomen, 2001).

[3] Other common primes (Sumerian warrior, similarities and differences to family and friends) have a number of limitations. They are more unwieldy in studies in which repriming is required. The family and friends prime explicitly includes the relevant words (*similar, different*). The Sumerian warrior prime is about choosing generals for battle, so may differentially cue collectivism depending on the particular political circumstances in a country or region. We wanted to demonstrate that individual and collective mind-sets influence processing of basic cognitive procedures without the possible confound that the task used words or content directly relevant to the procedure.

[4] For example, Ader and Tatum (1963) found that participants working alone needed much less time to learn the way to avoid a shock than participants working in pairs but that having learned the procedure, pairs were more successful than individuals in successfully applying the procedure to avoid the shock.

in the case of culture research, participants in a control group cannot be inferred to not be using an individual or collective mind-set. On the one hand, control participants on average are likely to be influenced by chronically salient culture (e.g., individualism for Americans, collectivism for Chinese), and on the other hand, the experimental context itself may contain individual or collective mind-set cues. Thus, priming all participants rather than comparing to a control group reduces ambiguity because it is not clear which cultural mind-set control participants bring to bear on the task at hand. That said, there is some evidence in our current results that incongruence between primed mind-set and the procedure suited to the task at hand matters. In each of the presented studies, the mind-set-relevant procedure was used even when it was not best suited for the task at hand. Moreover, in Study 8, the results suggested that a primed collective mind-set hampered performance on a task best suited for a separate and pull-apart analytic cognitive procedure even relative to a nonprimed control group.

Culture as Situated Cognition

A situated cognition model makes three points critical to understanding how culture matters. First, cognitive processes are context sensitive such that psychologically meaningful situations influence cognition. Second, context sensitivity does not depend on conscious awareness. Third, context effects can be demonstrated for social knowledge, cognitive processes, and even goals. Effects in one domain do not necessarily mediate effects in another (Smith & Semin, 2004). We have demonstrated that East–West differences in cognitive procedures can be understood using a situated cognition model. This implies that when societies differ in chronic individualism and collectivism, they differ in whether an individual or collective mind-set is likely to be triggered, not in whether both mind-sets could be triggered at all.

How are individual and collective mind-sets cued in everyday life? We have demonstrated effects in a laboratory setting using a priming task that is language-based and uses plural and singular first-person pronouns. These task features may be relevant to how individual and collective mind-sets are cued outside of a laboratory setting. First, structure of language may matter (see Y. Kashima et al., 2006). Second, the particular values or ways of thinking about the self cued by the pronouns may matter. For example, societies may differ in how frequently singular and plural first-person pronouns are used or in whether the self is commonly construed in a first-person singular or plural form (see Brewer & Gardner, 1996; Brewer & Roccas, 2001).

However, our sense is that it is unlikely that, outside of the laboratory, effects are simply due to these components for a number of reasons. First, a straightforward attempt to obtain frequencies of use of singular and plural pronouns did not yield clear results.[5] Second, though a number of studies have considered whether individuals differ cross-nationally in how the self is described (e.g., Y. Kashima et al., 1995), an equally plausible alternative is that cross-national differences are more subtly based on the frequency that individual, relational, and collective identities are cued. For example, Brewer (1991) suggested that when context primes a need to be similar to others, then both relational and collective self-concepts are salient, while individual selves are salient when context primes a need to be different from others. However, though individual identities focus on difference between self and others and relational identities focus on similarity between self and related others, collective identities focus on both the similarity between self and ingroup others and the difference between self and outgroup others (Brewer & Roccas, 2001).

Do salient values or self-concept mediate cognitive procedures? Our situated cognition model does not presuppose mediation via self-concept or values. Demonstrating that effects are mediated by self-concept or by values would require more than simply showing that a priming task affects responses to value or self-concept variables. It would require demonstrating a mediation effect. Over the past 20 years, a number of scholars have made relevant arguments. Triandis and his colleagues (Triandis, 1989; Trafimow et al., 1991) first explicitly argued for a connection between self-concept, cognitive style, and cultural differences in a way compatible to the literature on cognitive priming (Srull & Wyer, 1979, 1980). Triandis (1989) and Trafimow (Trafimow et al., 1991) both argued that culture determines whether one is likely to think in terms of one's private or collective self-concept, not whether one has such a self-concept at all. In a series of studies, Trafimow and colleagues (1991) demonstrated that priming shifts content of self-concept (toward private or collective) and that having previously used a private or collective self-concept increases likelihood of subsequent congruent self-focus. Moreover, Triandis asserted that these shifts in self-concept content should also influence judgments—in particular, whether norms or personal preferences are used.

At the same time, research on the interface between structure of self-concept and cognitive style was also emerging. Woike and her colleagues (e.g., Woike, 1994; Woike, Lavezzary, & Barksy, 2001) demonstrated differences in cognitive style associated with self-concept; they assessed what they called agentic and communion self-concepts and found that people with the latter self-concept preferred a connecting and integrating cognitive style. Congruent with these arguments were two reviews of the literature. First, Markus and Oyserman (1989) reviewed the literature on gender-based cognitive differences. Early cognitive schemas defining the self as connected to or as separate from others were argued to explain average between-gender differences in cognitive processes. For example, Markus and Oyserman argued that males average better scores in tasks requiring context-independent reasoning and the capacity to pull a target figure out of context given early organization of the self as separate. More generally, they used this literature to argue that cognitive differences are based on differences in how the self is likely to be organized because self-structure makes chronically salient congruent cognitive procedures. They contrasted connected, ensembled, and integrated self-concepts with autonomous, independent, and separate self-concepts, arguing that differences in likely focus of self-concept should be true of non-Western populations as well, stating, "We assume that connectedness and separateness self-schemas influence thinking, not just about the self but about all objects, events, and situations" (Markus & Oyserman, 1989, p. 101).

[5] Sources such as Wortschatz—Universität Leipzig (http://corpora.informatik.uni-leipzig.de) did not provide a clear pattern of more use of singular pronouns and less use of plural pronouns in Norwegian and English compared to more use of plural pronouns and less use of singular pronouns in Korean and Chinese.

Like Markus and Oyserman (1989), Markus and Kitayama (1991) contrasted East and West and assumed effects are mediated through structure of self-concept. However, they shifted nomenclature to independent and interdependent and further described differences in self-concept between East and West, arguing that these differences shape other important cross-national differences. Markus and Kitayama's terminology was also used by Dijksterhuis and Van Knippenberg (2000) and by Hannover, Kühnen, and colleagues (Hannover & Kühnen, 2004; Kühnen et al., 2001; Kühnen & Oyserman, 2002). Explicitly locating their argument within a social cognition framework, these authors proposed that when an independent or interdependent self-concept is cued, the relevant procedures are also cued. They provided supporting evidence from priming studies within the Netherlands, Germany, and the United States. Although these studies demonstrated effects of priming on content of self-concept, values, and cognitive process, they did not provide evidence that the impact of priming on content of self-concept and/or values mediates the effect of priming on cognitive process. Studies explicitly attempting to examine mediation have not yielded consistent effects (for reviews, see Matsumoto, 1999, 2002; Oyserman, Coon, & Kemmelmeier, 2002).

Concluding Remarks

Results support a culture-as-situated-cognition model. The model implies that language use, as well as self-concept, goals, and motivation, may cue mind-set because any psychologically salient feature of the situation that is relevant to action in the situation should matter. As we have outlined above, the supposition that these effects are mediated by change in self-construal is clearly articulated in prior models. We do not disagree that this is a possible process model but suggest that a more parsimonious model is to assume that individual and collective mind-sets may be cued directly and that evidence to date has not directly addressed whether the process is necessarily via self-concept. Thus, outside a laboratory setting, exam instructions or other features of the situation may directly cue a collective or individual mind-set, thus connecting and integrating or pulling apart and separating cognitive procedures or goals. Cued procedures and goals may themselves cue relevant self-construals.

An important limitation of nonpriming research into cultural influences on cognition has been that cross-national comparison (e.g., Nisbett, 2003) cannot isolate the role of specific components of culture. Prior research comparing the United States with China and Japan has focused on chronic differences in cognitive processes, with Chinese being more holistic, seeing the big picture (Nisbett, 2003), and Japanese being more relativistic (Kitayama et al, 2003) than Americans, who are more analytic and absolute in their perceptual judgment. At least some of these differences can be linked to brain activity (Hedden, Ketay, Aron, Markus, & Gabrieli, 2008; Tang et al., 2006; Zhang, Zhou, Zhang, Fan, & Zhu, 2006). While interesting, these studies have not illuminated the process by which differences occur.

Our findings are congruent with these cross-national results but move beyond more static models of culture to suggest that effects are due to differences in the content, cognitive process, or goals cued in the moment. Specifically, participants in diverse societies acquire the procedural repertoires associated with both individualism and collectivism, and these active ingredients of culture influence not only cognitive content but also the use of relevant cognitive procedures. We have demonstrated that individual and collective mind-set priming effects occur in the East as well the West and are not due to a unique malleability of Western or European American participants. Taken together, our results suggest that cultural mind-sets matter in similar ways across societies and within heterogeneous societies.

We have also explicitly shown that within heterogeneous societies, a mismatch can occur between the cultural mind-set that is cued in context and the mind-set that is best suited to the task at hand. Take the case of standardized tests like the GRE. A collective mind-set cue may be salient for some test takers but not others due to small changes in context, such as whether the exam takes place in an individual cubicle or in a classroom setting. Other cues can also matter. Within an American context, for example, the test-taking context may make minority racial, ethnic, or social class identities salient, cuing social goals such as "make my parents proud" and triggering a collective mind-set. When a pull-apart and separate mind-set is suitable to the task at hand, cuing a collective mind-set undermines performance.

However, our model and results also suggest that cultural mind-sets can be relatively easily shifted. Groups are neither stuck with mind-sets ill suited to tasks nor gifted with mind-sets well suited to tasks. Rather, even though mind-sets may appear stable within a particular context, they are malleable and sensitive to subtle shifts in pragmatic meaning. Small interventions may produce important changes. Whether effects are necessarily mediated by self-concept shift, by language, by value shift, or by some other psychologically meaningful features of the immediate context awaits further research.

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