

The Semantic-Procedural Interface Model of the Self: The Role of Self-Knowledge for Context-Dependent Versus Context-Independent Modes of Thinking

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How do independent and interdependent self-construals affect cognition? The authors proposed the semantic-procedural interface model, which distinguishes 2 such mechanisms. In addition to semantic differences, different procedural modes of thinking are associated with independent and interdependent self-construals. Independent self-definitions coincide with the tendency to process stimuli unaffected by the context in which they appear. Interdependent self-construals facilitate context-bounded thinking (i.e., processing stimuli by paying attention to their relation to the given context). With semantic-free dependent variables, 4 experiments showed independence-primed participants to exhibit higher degrees of context independence than did interdependence-primed participants. The results are discussed with reference to their potential explanations for cross-cultural differences.

Many researchers have argued that a variety of differences between individualist and collectivist cultures can be traced back to different ways of construing identity within these cultures (e.g., Gardner, Gabriel, & Lee, 1999; Markus & Kitayama, 1991; Oyserman & Markus, 1996; Triandis, 1989). Markus and Kitayama (1991) claimed that culture includes a set of often implicit normative tasks one has to fulfill to be a good person. These culturespecific social representations about what it means to be a good person guide individual development. In individualist societies, there is a cultural imperative to be a unique and independent person, to strive for this uniqueness, and to express it openly (e.g., Shweder & Bourne, 1984). As a consequence, the self is predominantly defined in terms of internal features like traits, abilities, and attitudes (e.g., Oyserman & Markus, 1993; Rhee, Uleman, Lee, & Roman, 1995; Trafimow, Triandis, & Goto, 1991). In contrast, the collectivist cultural imperative is to be a dependable member of relevant social groups. Accordingly, the self is defined in terms of interdependent self-construals (e.g., relationships to others, group memberships, and social roles; Markus, Kitayama, & Heiman, 1997; Oyserman & Markus, 1993; Trafimow et al., 1991).

Judgments and behavior are assumed to be guided either by reference to the internal repertoire of independent characteristics or, in the interdependent self-construal, by the expectancies of other group members. In this construct, fitting in the group and

However, the exact mechanism by which the self guides human cognition and behavior has still not been fully understood. In the present article, we propose the semantic-procedural interface (SPI) model of the self, according to which two such mechanisms need to be distinguished. As many other researchers have suggested before (see Fiske, Kitayama, Markus, & Nisbett, 1998, for a review), one mechanism refers to the different *semantic content areas* from which independent and interdependent self-construals arise. Within the independent perspective on the self, identity is defined in terms of autonomous characteristics, whereas the interdependent perspective includes social self-descriptions. Hence, the respective self-construals make available different semantic knowledge that is most likely to be applied when judging the self or others. As a consequence of this *semantic application mechanism*, judgments are assimilated toward the semantic implications of available self-knowledge. Our model proposes that in addition to this content-based semantic application mechanism, self-construals of one kind or the other provide different *procedural modes of thinking* (see, also, Hannover, 2000).

These different ways of processing information are cognitive residues of the procedures used during the acquisition of independent and interdependent self-construals. Independent self-knowledge is acquired by aggregating self-descriptive characteristics across the various social contexts one encounters. On the other hand, developing an interdependent perspective on the self requires one to relate the self to specific social contexts in which relevant others are encountered. Thus, we assume the degree of *context relatedness* in information processing to be a key difference between the acquisition of independent and interdependent self-knowledge.

Accordingly, we postulate that independent self-knowledge coincides with a context-independent mode of thinking that can be characterized as a tendency to process stimuli as if they were

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behaving appropriately with respect to the position one occupies within the group become personally relevant goals.

unaffected by the given context. In contrast, the interdependent view reflects a tendency to process information about stimuli while paying attention to their connection with the surrounding context. As a result, independent and interdependent self-construals bring about different modes of thinking, which are applied to the cognitive tasks at hand. We refer to this as a procedural application mechanism of the respective self-construals. In summary, not only semantic but also procedural implications of independent and interdependent self-knowledge are assumed to influence ongoing information processing.

We argue that semantic and procedural application mechanisms of available self-knowledge are linked by an interface. This is to say that both application mechanisms can influence ongoing information processing independently of each other but simultaneously. Moreover, the notion of an interface implies that if the availability of semantic self-knowledge of one kind or the other is increased, the corresponding procedural mode of thinking is induced as well. Hence, semantically priming independent self-knowledge is assumed to induce context-independent information processing, whereas priming interdependent self-knowledge is expected to result in context-dependent thinking.

Before outlining this procedural application effect of independent versus interdependent self-construals, we review previous research on the consequences of the different semantic contents of the respective self-conceptualizations.

Semantic Application Mechanism of Independent and Interdependent Self-Construals

Within the information processing paradigm of social cognition research, the self can be understood as a multifaceted and flexible memory structure (Hannover, 1997; Linville & Carlston, 1994; Markus & Wurf, 1987). That is, self-knowledge is mentally represented in multiple clusters describing different aspects of the self (e.g., traits and abilities, personal group memberships, or social roles), and flexibly varies according to which self-construal is primed in a given context (Markus & Wurf, 1987). *Interindividual* differences in defining the self can be accounted for by the chronic accessibility of different self-construals (cf. Higgins & King, 1981; Markus, 1977). *Intraindividual* changes in construing identity result from contextual influences that situationally increase a self-construal's accessibility (cf. Higgins, Rholes, & Jones, 1977).

When we apply this social cognition perspective on the self to the explanation of cultural differences, we can understand culture as a chronic source of activation of relevant self-construals (e.g., Gardner et al., 1999; Hannover, 1997; Kühnen, 1999; Trafimow, Silverman, Mei-Tai Fan, & Shui Fan Law, 1997; Trafimow et al., 1991). In an attempt to solve the previously mentioned culturally mandated developmental tasks (Markus & Kitayama, 1991), individuals use self-construals that are related to these tasks over and over again. As a result, these construals become highly accessible over time. A variety of studies have shown that individuals use highly accessible semantic constructs as a basis for judgments and decision making (Bargh, Chen, & Burrows, 1996; Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1979). As a result of the application of different semantic knowledge, judgments and behaviors are assimilated to the connotative and denotative (i.e., the semantic) content of the mental categories that are accessible at the time the judgment is to be made. Applied to cross-cultural differences, for

individualist culture members, judgments are more likely to be assimilated to the autonomous semantic contents of their highly accessible independent self-construals. In contrast, because interdependent self-construals are highly accessible in individuals from collectivist cultural backgrounds, these individuals' judgments can be expected to be assimilated to these self-construals' social semantic content. In the SPI model, the effect of this mechanism on information processing is called the *semantic application effect*.

This reasoning can account for a variety of differences between individualist and collectivist culture members, such as the tendency to overestimate dispositional (i.e., traitlike) factors in social explanations relative to situational ones by individualist compared with collectivist culture members (e.g., Miller, 1984; see Choi, Nisbett, & Norenzayan, 1999, for a recent review). When we apply the previously mentioned reasoning, attributions of behaviors can be considered naturally ambiguous judgmental tasks that can therefore be expected to be assimilated to highly accessible concepts. Because trait concepts are highly accessible for individualist culture members, members of these cultures are likely to apply such dispositional categories to the interpretation of observed behavior. As a result, their judgments can be expected to be assimilated to highly accessible knowledge in terms of trait categories, coinciding with an underestimation of situational influences. To the extent that such dispositional categories are less accessible for collectivist culture members, their judgments are not assimilated in this way. Accordingly, these people are less likely to show the preference for dispositional rather than situational attribution styles.

The same kind of reasoning has been applied to explain a large variety of information processing differences between individualist and collectivist culture members, including self-other similarity ratings (e.g., Kühnen, 1999), the reported frequency of experiencing ego-focused versus other-focused emotions (Matsumoto, 1989), individual versus social sources of self-esteem (Kitayama, Markus, Matsumoto, & Norasakkunkit, 1997), and the readiness to strive for personal goals versus the readiness to fulfill social obligations (Oyserman, Sakamoto, & Lauffer, 1998). Although these studies differ with respect to the particular variables being investigated, they all share the underlying assumption that accessible self-knowledge is applied to social judgments in a given context, resulting in assimilated responses. Accordingly, differences between individualist and collectivist culture members have been traced back to the high accessibility of self-construals from either autonomous or social content areas.

Priming Independent Versus Interdependent Self-Construals

As we have outlined, a variety of researchers view self-construals arising from different semantic content areas as the critical variable in explaining cross-cultural differences. This causal assumption cannot, however, be tested within the quasiexperimental designs that have typically been used in crosscultural research. If the accessibility of different self-construals is the critical variable by which cultural differences can be explained, experimentally varying these self-construals' accessibility should mirror cross-cultural differences. Recently, some suitable priming techniques have been developed for this purpose. For instance, Trafimow, Triandis, and Goto (1991) randomly assigned research

participants from individualist (U.S.) or collectivist cultures (Chinese students who lived in the United States) to one of two priming conditions. In the condition designed to activate private (i.e., independent) self-construals, participants were asked to think about differences between themselves and their family and friends, whereas research participants in the condition designed to activate public (i.e., interdependent) self-construals were asked to think about what they had in common with their family and friends. In a subsequent self-description task (i.e., 20 spontaneous answers to the question "Who am I?"; Twenty Statements Test; Kuhn & McPartland, 1954), Trafimow et al. found that participants who had previously thought about differences described themselves using more independent self-construals (e.g., "I am intelligent") and fewer interdependent ones (e.g., "I am a sister of Tom") than did participants who had thought about their similarities to others. The same pattern of result was observed when comparing participants from individualist and collectivist backgrounds. Thus, culture (as a chronic source of activation) and the situational priming affected the accessibility of self-knowledge independently of each other. Trafimow et al. (1997) replicated these results with Chinese participants living in China. In both studies, participants' self-descriptions were assimilated to the semantic content of highly accessible self-construals, with the source of this accessibility stemming from both chronic and situational activation.

In a recent study, Gardner et al. (1999) adopted a priming method first introduced by Brewer and Gardner (1996). Research participants read a brief paragraph about a trip to a city and were instructed to circle all pronouns in the text. In the independent condition, almost all of the 19 pronouns represented the individual self (e.g., I, *mine*), whereas in the interdependent condition, the pronouns represented relationships (e.g., *we*, *our*). Research participants then completed a values inventory (Schwartz, 1992), a social judgment task that measured the extent to which interpersonal norms of helping behavior were seen as objective obligations (Miller, Bersoff, & Harwood, 1990), and the Twenty Statements Test (Kuhn & McPartland, 1954). Gardner et al. (1999) found that the differences between the two priming conditions mirrored differences between individualist and collectivist culture members. In particular, participants in the independent priming condition endorsed more individualist values and perceived social obligations as less important, and their descriptions of themselves were more pronounced in terms of independent self-construals than were those of the participants in the interdependent priming condition (Experiment 1). In a second experiment, Gardner et al. replicated their results with participants who had either an individualist cultural background (United States) or a more collectivist one (Hong Kong).

Haberstroh, Kühnen, Oyserman, and Schwarz (2000) adopted the pronoun-circling task from Gardner et al. (1999) and investigated consequences on the observation of conversational norms. On the basis of cross-cultural studies showing that attentiveness to others is a self-defining goal within the interdependent rather than the independent perspective on the self (see Fiske et al., 1998, for an overview), Haberstroh et al. expected self-construals to influence

the extent to which individuals monitored the common ground and engaged in cooperative conversational conduct. After being primed for independence or interdependence, participants received partially (Experiment 1) or fully (Experiment 2) redundant questions. As expected, interdependence-primed participants

were more likely to avoid redundant answers than were independence-primed participants.

In summary, the results of Trafimow et al. (1991, 1997), Gardner et al. (1999), and Haberstroh et al. (2000) show that cultural differences in self-construals can be simulated by means of priming self-construals, suggesting that culture affects human cognition and behavior through the relative accessibility of independent versus interdependent self-construals.

Procedural Application Mechanism of Independent and Interdependent Self-Construals

So far, we have ascribed cultural differences in information processing to differences in the semantic content of highly accessible self-construals. The SPI model proposes an additional mechanism by which the nature of self-knowledge may affect human cognition and behavior. We propose that different ways of processing information are associated with independent and interdependent self-knowledge. While developing an independent or interdependent perspective on their self, people apply modes of thinking that differ in their degree of context relatedness. We assume that cognitive residues of these modes of thinking become associated with independent and interdependent self-construals. Developing an independent sense of the self requires one to generalize self-descriptive features across the various contexts one encounters. For instance, traitlike self-knowledge is the result of aggregating self-descriptive features across different contexts. Hence, the acquisition of independent self-knowledge relies on context-independent thinking procedures. On the other hand, defining the self in terms of relationships implies viewing identity as bound to the social context in which one encounters significant others. To maintain interdependence with others, collectivist culture members value being respondent to the expectations and needs of others. Accordingly, they focus their attention on the social situation. Because others' expectations and needs have to be inferred constantly anew, the core aspect of the self, the interdependence with others, is naturally respondent to contextual changes. Accordingly, while developing an interdependent perspective, people think about themselves in context-dependent terms. Therefore, our model predicts that if independent self-knowledge is accessible in a given situation, cognitive procedures for context-independent thinking are active. Interdependent self-knowledge, however, is expected to foster context-dependent thinking, because this mode of thinking results from the development of an interdependent sense of the self. Thus, if self-construals of one kind or the other are accessible in a given situation, people will most likely apply to the given judgmental tasks the modes of thinking that coincide with these self-construals. In the SPI model, the effect of this mechanism on information processing is called the procedural application effect.

Many researchers have provided empirical data that can be taken as evidence for the procedural application effect. For instance, several studies have shown that if independent (rather than interdependent) self-knowledge is accessible, people describe themselves in more abstract ways and with fewer references to specific contexts. For instance, Cousins (1989) administered the Twenty Statements Test (Kuhn & McPartland, 1954) to American and Japanese students and found that Americans used more abstract personality descriptors (e.g., "I am easygoing") than did

Japanese, who used more concrete self-descriptions referring to specific social situations (e.g., "I am one who plays mah-jongg on Friday nights"). In other words, Japanese self-descriptions were more context bound than were the context-free American ones. Similarly, Rhee et al. (1995) classified answers to the Twenty Statements Test as abstract or concrete, finding Korean self-descriptions to be more concrete than were those of Americans.

This difference in the degree of context dependency of independent and interdependent self-construals is also addressed in the items of one of the standard rating scales used in cross-cultural studies designed by Singelis (1994). His Self-Construal Scale, which attempts to measure the independence and interdependence of a person's self, includes statements like "My happiness depends on the happiness of those around me," hence directly asking participants to rate the context dependency of their self. Singelis referred to this aspect as follows:

When individuals with highly developed interdependent self-construals think about themselves or others, there is a sense that the self and others are intertwined. In addition, both self and other are not separate from the situation but are molded by it. (p. 581)

In a recent review of cross-cultural studies, Choi et al. (1999) concluded that "in sum, when they describe themselves or others, East Asians tend to make more contextual references and fewer dispositional references than European Americans, implying that they have a more contextualized theory of behavior" (p. 49).

More direct evidence of the context-independent nature of independent self-construals was provided by Niedenthal and Beike (1997), who experimentally primed either isolated (i.e., independent) or interrelated (i.e., interdependent) self-construals. In the interrelatedness condition, participants described a sibling in comparison to themselves, whereas in the isolated priming condition, they described the sibling and themselves independently of each other. Participants selected the traits that best described themselves and the sibling from a list of traits previously categorized as having one of three levels of abstraction: subordinate (e.g., musical, punctual), middle (e.g., artistic, dutiful), and basic level (e.g., talented, responsible). Participants in the isolated-self condition used more basic and less subordinate adjectives to describe themselves than did those in the interrelatedness-priming condition. Thus, priming independent self-construals led to a more abstract level of self-description than did priming interdependent self-construals.

In summary, both cross-cultural and priming research show that independent self-construals are more abstract and less context dependent in nature than are the more concrete and more context bound interdependent self-construals. This difference can be taken as evidence for the association of different modes of thinking with independent and interdependent self-construals.

The Semantic-Procedural Interface of Self-Knowledge

We have now argued that independent and interdependent self-construals influence ongoing information processing by two distinct mechanisms. First, independent self-construals make available self-knowledge arising from autonomous semantic content areas, whereas interdependent self-construals include social aspects of the self. Because people apply highly accessible semantic knowledge to judgmental tasks, their answers can be expected to

be assimilated toward the implications of either independent or interdependent self-construals. The second proposed mechanism originates from different procedural modes of thinking used while developing either an independent or interdependent sense of the self. Independent self-construals provide context-independent information processing modes—that is, the tendency to process stimuli as if they were unaffected by the context in which they appear. On the other hand, coinciding with interdependent self-knowledge is the tendency to process stimuli while paying attention to their relations to the entire field. It is the central hypothesis of the SPI model that semantic application effects of autonomous or social contents, by which the self can be described, are closely intertwined with procedural differences in the degree of context relatedness of thinking. Semantic and procedural application effects of the respective self-construals can take effect at the same time, because they are linked by an interface. Therefore, it can be inferred from the SPI model that priming independent self-construals results in two distinct consequences: First, with regard to activated contents, it should bring autonomous self-knowledge to mind (semantic mechanism). At the same time, it should induce a context-free thinking mode (procedural mechanism) as a second consequence. Activating interdependent self-construals, however, should make social (semantic) self-construals accessible and additionally prime context-bound cognitive procedures. Hence, because semantic and procedural consequences of self-construal activation are linked by an interface, the semantic priming of self-knowledge of one kind or the other is expected to induce the cognitive procedures associated with them.

We have now stated that interdependent and independent self-construals should guide human cognition and behavior simultaneously through two different routes. To test this assumption, we must disentangle the mechanism to which a given priming effect can be traced back. Following our theoretical assumptions, priming of independent versus interdependent self-construals has both semantic and procedural consequences. Accordingly, priming effects on subsequent judgments may be due to either mechanism independently or to both mechanisms simultaneously. To show that semantically priming certain self-construals affects modes of thinking, we used the concept of field dependence (Witkin, 1950). Field dependence is a variable that is free of any semantic meaning but should be sensitive to variations in the degree of context dependency of available self-knowledge. This construct describes the degree to which a person is influenced by a given field or is independent from it (i.e., the context) when processing information. To measure field dependence, Witkin (1950) developed the Embedded Figures Test (EFT), in which participants are given a series of complex visual patterns and asked to discern smaller geometrical figures that are embedded in them. In other words, the embedded figure must be found within a given context. The complex figures have been specifically designed to obscure the simple ones. The more strongly individuals are influenced by the given context (i.e., the more field dependent they are), the more time they should need to identify the embedded figure. We expected that (semantic) priming of independent (rather than interdependent) self-construals would result in a more context-independent (procedural) cognitive mode (i.e., in a higher degree of field independence).

Study 1

Method

Participants. Research participants were 51 undergraduate psychology students from the University of Dortmund (31 female, 20 male). The mean age was 22.6 years ($SD = 3.4$). The participants were randomly assigned to the experimental conditions.

Procedure and materials. We used the priming technique designed by Trafimow et al. (1991, 1997) to activate either independent or interdependent self-knowledge. In the independent priming condition, participants thought about how they are different from their family and friends. In the interdependent priming condition, participants thought about their similarities to their family and friends. Afterward, participants worked on the version of the EFT developed by Witkin, Oltman, Raskin, and Karp (1971).

Both the priming task and the EFT were explained to the participants at the beginning of the study to minimize the delay between the two measures. This seemed advisable, because the explanation of the EFT is somewhat complicated and could therefore have attenuated the priming effect if provided immediately before the test. Participants were instructed to work as quickly and as accurately as possible. Following the instructions, participants worked on the priming task. Three minutes later, they were interrupted and were asked to start working on the EFT.

An example item from the EFT is presented in Figure 1. Participants completed 12 such trials (3 of which were practice trials), each consisting of a complex figure in which a simple one was embedded. For each trial, participants were first shown the complex figure for 10 s. Next, the complex figure was hidden, and the simple figure was presented for 10 s. Then both figures were presented again, and the participant searched for the simple figure in the complex one. At this moment, a stopwatch was started to measure how long it took the participant to solve the task. If the participant said "stop," indicating that he or she had found the target figure, the intermediate time was noted, and the stopwatch was kept running. The participant pointed out where the simple figure was embedded in the complex one. If the answer was correct, the used time was taken down as the dependent variable. If the answer was incorrect, the participant continued trying to solve the problem, while the stopwatch kept running. If the participant did not solve the problem within 3 min, the experimenter presented the next item. After the participant had worked on all 12 items, he or she was debriefed, thanked, and dismissed.

Results

We expected that priming independent self-knowledge would induce a more context-independent cognitive mode, indicated by shorter solution times than for priming interdependent self

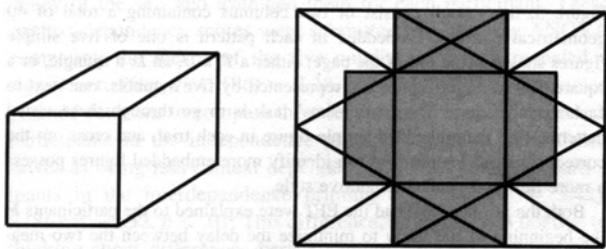


Figure 1. Example item from Witkin's (1969) Embedded Figures Test: simple and complex figure. Modified and reproduced by special permission of the Publisher, Consulting Psychologists Press, Inc., Palo Alto, CA 94303 from *Embedded Figures Test* by Herman A. Witkin. Copyright 1969 by Consulting Psychologists Press, Inc. All rights reserved. Further reproduction is prohibited without the Publisher's written consent.

knowledge. Because reaction times in general show skewed distributions, we first log transformed the solution times for each trial. To test our hypothesis, we entered the log-transformed solution times into a 2 (priming) \times 2 (gender) \times 9 (trial) analysis of variance (ANOVA) with priming and the participants' gender as between-subjects factors and the nine trials as a within-subject, repeated measurement factor. Participants' gender was introduced as a factor because some former studies have shown that men in general tend to be more field independent than women are (see Voyer, Voyer, & Bryden, 1995, for a review). As expected, this ANOVA revealed a significant main effect for the priming condition, $F(1, 47) = 5.14, p < .05$. Overall, participants in the independent priming condition were faster in solving the items ($M = 0.89, SD = 0.25$) than were participants in the interdependent priming condition ($M = 1.03, SD = 0.30$). As is illustrated in Figure 2, except for the first trial, the log-transformed solution times for all items were smaller for participants from the independent priming condition than for participants from the interdependent priming condition. Thus, priming independent selfknowledge led to a greater field-independent processing style than did priming interdependent self-knowledge. We also found a reliable gender difference, $F(1, 47) = 5.35, p < .05$. As predicted by previous research (Voyer et al., 1995), male participants were faster ($M = 0.87, SD = 0.33$) than were female participants ($M = 1.02, SD = 0.24$). It is not surprising that the ANOVA revealed a significant main effect for the within-subject factor, indicating that the items varied in difficulty, $F(8, 376) = 22.94, p < .001$.

Discussion

As we expected, thinking about differences or similarities to one's family and friends during the priming task affected participants' cognitive style on the EFT. In particular, priming independent self-knowledge induced a more context-independent information processing style than did the activation of interdependent self-knowledge. This result is in line with the proposed assumption of SPI, which holds that self-construals do not simply differ with respect to their semantic content. Rather, they coincide with different modes of thinking. Independent self-construals are associated with context-independent thinking. Accordingly, priming independent self-construals induces a cognitive style in which stimuli are perceived as independent from the given field. In contrast, thinking about the self in terms of relationships to others originates from relating the self to the specific social contexts in which one meets the significant others. Therefore, activation of interdependent self-construals facilitated a mode of thinking in which attention is directed to the relations of objects to their field. It is important to note that this effect cannot be explained in terms of semantic content but only sensitive to the degree of context dependency in information processing.

However, one could doubt that the priming effect we found in this study is due to the activation of different kinds of selfknowledge. Thinking about differences between one object and a group of others may, by itself, induce a context-free mode of thought, irrespective of any relation to the self. By the same token, thinking about what one object and a group of others have in common may trigger a more holistic mindset (Gollwitzer, Heckhausen, & Steller, 1990), fostering context-dependent thinking.

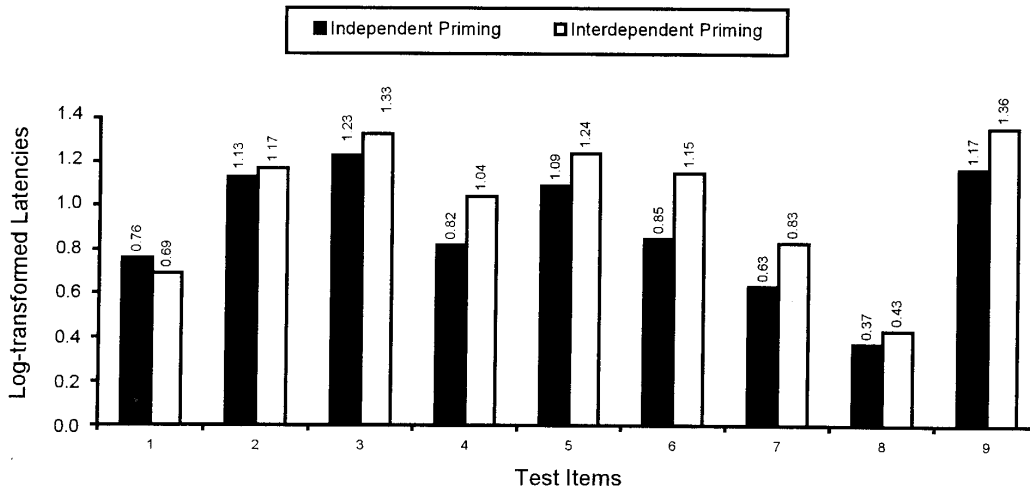


Figure 2. Mean log-transformed latencies for test items of participants with independent ($n = 24$) and interdependent ($n = 27$) priming.

again with no need for self-knowledge to be involved. In other words, so far, we have not established the critical prediction of our model, that the procedural effect measured in the EFT can indeed be attributed to the activation of different kinds of semantic self-construals.

Study 2

Study 2 was designed with three goals. First, we wanted to rule out the alternative explanation that thinking about differences versus similarities by itself induced different mindsets. For that purpose, we extended Study 1 in two respects. First, we varied the target of the priming. Participants in two further conditions were asked to think about the differences (versus the similarities) between cats and dogs. If the effect shown in Study 1 can in fact be attributed to the activation of different self-construals, thinking about differences or similarities in this nonself-related manner should not affect context dependency in information processing. On the other hand, if general mindsets are induced by the kind of priming (differences vs. similarities), the target of this procedure should not make a difference. The SPI model would be confirmed if subsequent effects on the EFT could only be observed after self-construal priming but not if the nonself-related conditions showed the same difference.

Second, to give more direct evidence for our proposed assumption, we directly assessed the degree to which participants described themselves as being context dependent. After the participants worked on the EFT, they answered three items from Singelis' (1994) Self-Construal Scale, which directly asks the participants to rate the context-dependency of their self. Our model would be confirmed if these ratings were influenced only by the self-related priming. The second goal of Study 2 was to replicate the effect shown in Study 1 using a slightly different measure of field dependence. On the basis of Study 1, it is not possible to judge whether both the independent and the interdependent prim-

ing were effective. Therefore, our third goal was to answer this question by including a no-prime condition.

Method

Participants. The study was conducted at the University of Dortmund. One hundred ninety-one undergraduates (131 female, 60 male) served as participants in the study as part of a course requirement. They were randomly assigned to the conditions.

Procedure and materials. To prime independent versus interdependent self-knowledge, we used the same procedure as in Study 1. Participants in the independent priming condition (Condition 1) thought about how they are different from their family and friends, whereas in the interdependent priming condition (Condition 2), participants thought about their similarities to their family and friends. In Condition 3, participants were asked to think about differences between cats and dogs, whereas in Condition 4, they were asked to think about what cats and dogs have in common. Additionally, a fifth, no-prime condition was included in the study.

We then measured field dependence using Horn's (1962) self-administered version of the EFT. This version of the EFI, allows for a measurement of field dependence in a group session. As is illustrated in Figure 3, the stimuli consist of two columns containing a total of 40 geometrical patterns. Embedded in each pattern is one of five simple figures shown at the top of the page; either a T, a U, an L, a triangle, or a square. These target figures are represented by five symbols, one next to each visual pattern. The participants' task is to go through these visual patterns, find the embedded simple figure in each trial, and cross out the correct symbol.¹ People who can identify more embedded figures possess a more field independent cognitive style.

Both the priming task and the EFT were explained to the participants at the beginning of the study to minimize the delay between the two measures. Participants were instructed to work as quickly and as accurately as possible. Participants first worked on the printing task. Three minutes later,

¹ It is important to note that the embedded figures must correspond to the ones shown on the head of the page with respect to their size and position. Also, there may be additional lines that cross the embedded figure.

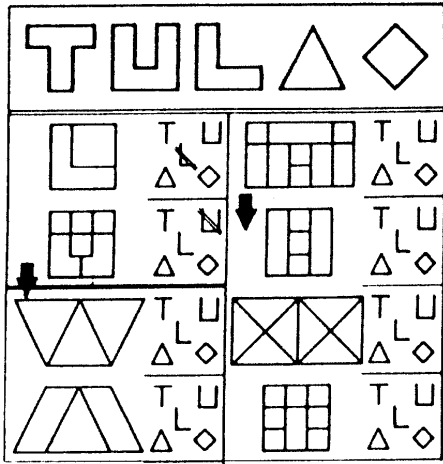


Figure 3. Part of Horn's (1962) self-administered version of the Embedded Figures Test. From *Leistungsprüfsystem, L-P-S: Handanweisung für die Durchführung, Auswertung und Interpretation* [A Performance Testing System: Manual for Administration, Scoring, and Interpretation], by W. Hom, 1962, Göttingen, Germany: Hogrefe-Verlag. Copyright 1962 by Hogrefe-Verlag. Reprinted with permission.

they were interrupted and were asked to start working on the EFT. After 2 min, participants were asked to stop.

Finally, we presented three items taken from Singelis' (1994) Self-Construal Scale; these items directly ask one to assess the degree of context dependency of the self and are rated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Specifically, we presented the following items: "My happiness depends on the happiness of those around me," "I am the same person at home that I am at school," and "I act the same way no matter who I am with." After participants had answered these three items, the study was over.

Results

Context dependency in self-descriptions. To test our hypothesis, we first coded the three items from the Self-Construal Scale such that higher scores indicated higher degrees of context dependency of the self and averaged them for each participant. These context-dependency scores were submitted to a one-way ANOVA comparing the means of the five conditions, which revealed a significant effect, $F(4, 186) = 2.38, p = .05$. We then conducted planned contrasts to compare the relevant conditions. As expected, participants in the independence priming condition rated themselves as being less context dependent ($M = 3.1$) than did participants in the interdependence priming condition ($M = 3.42$), $t(186) = -2.32, p < .01$. This difference, however, was not due to thinking about differences versus similarities per se, as the catsand-dogs conditions reveal. Thinking about differences between cats and dogs did not lead to a lower degree of context dependency of the self ($M = 3.5$) compared with thinking about the similarities between cats and dogs ($M = 3.3$), $t(186) = 1.31, p = .19$. Participants in the no-prime condition had a mean contextdependency score of 3.32, which falls in between the two self-

related priming conditions, as our hypotheses predict. However, this mean was only marginally significantly different from the independence priming condition, $t(186) = -1.57, p = .06$, and was not significantly different from the interdependent selfpriming condition, $t(186) = -.77, p = .22$.

As long as the no-prime participants are included in the analysis, a one-way comparison of all five conditions is necessary. However, our model predicts an interaction effect of the type of priming (i.e., thinking about differences vs. similarities) and the target (i.e., self or family and friends vs. cats or dogs). It is only possible to test this prediction if the no-prime condition is excluded from the analysis. Therefore, we next conducted a 2 (type of priming) X 2 (target) ANOVA on the mean context-dependency scores of the remaining conditions.² As predicted, the interaction effect was highly significant, $F(1, 48) = 6.79, p = .01$.

In summary, priming independent versus interdependent selfconstruals resulted in different degrees of self-rated context dependency. This difference cannot be traced back simply to thinking about differences versus similarities, as the nonself-related conditions show. However, the independence priming condition seemed to be stronger than the interdependence priming condition, as the comparisons with the no-prime conditions show.

Context dependency measured by the EFT. We next tested the main hypotheses of Study 2, concerning the effects of our manipulations on the degree of context dependency in information processing measured with the EFT. To achieve this, we counted the number of correctly identified embedded figures out of the 40 figures for each participant. We conducted the steps of analyses according to the order we had already followed for the self-rated context dependency.

To compare the mean scores of the five conditions, we submitted them to a one-way ANOVA. However, the predicted effect was, overall, only marginally significant, $F(1, 186) = 2.06, p = .08$. We then tested the predicted pattern of means with planned contrasts. First, we compared the self-related independence and interdependence conditions. As predicted, participants in the independent self-priming condition identified more embedded figures ($M = 27.17, SD = 6.68$) than did participants in the interdependent self-priming condition ($M = 23.82, SD = 7.21$), $t(186) = 2.11, p = .02$. Thus, we replicated the effect shown in Study I with a slightly different dependent variable. More important, however, this effect was not due to the differences-versus-similarities manipulation, as the nonself-related conditions show. If the participants had been thinking about differences between cats and dogs, they were not able to identify significantly more embedded figures ($M = 22.90, SD = 6.71$) than if they had been thinking about what cats and dogs have in common ($M = 24.23, SD = 7.33$), $t(186) = -.86, p = .39$. We tested whether both self-related priming conditions were different from the no-prime control condition to the same degree and in the predicted directions. Participants in the no-prime condition identified a mean of 25.10 ($SD = 5.89$) embedded figures, which falls in between the self-priming conditions.

² On the basis of the assumption that independence- interdependence is also related to gender (Cross & Madson, 1997), one might expect different context-dependency scores for male and female participants. An analysis introducing gender as an additional factor revealed, however, no further effect.

However, only the difference between the control group and the independent priming condition was marginally significant, $t(186) = 1.31$, $p = .08$, whereas the difference between the control group and the interdependence condition was not significant, $t(186) = .83$, $p = .20$.

As already outlined for the analysis of the Self-Construal Scale items, our prediction is insufficiently tested as long as the control group is included in the analysis. Following the preceding reasoning, we therefore excluded the control condition in an additional step and submitted the remaining conditions to a 2 (type of priming) X 2 (target) ANOVA. The predicted interaction effect was significant, $F(1, 148) = 4.2$, $p = .04$. Thinking about differences or similarities only affected the ability to identify embedded figures if the self was the target; it had no effect in the nonself-related conditions.

Finally, we included the participants' gender in the analysis, because Experiment I (as have other previous studies) showed that men are more field independent than women are. Although male participants in Study 2 tended to be more field independent ($M = 25.47$) than did female participants ($M = 24.19$), this difference was statistically insignificant, $F(1, 181) = 2.24$, $p = .14$.

Discussion

The results of Study 2 replicate the central finding from Study 1: Thinking about differences or similarities to their family and friends affected the participants' ability to detach geometrical figures from the context in which they were embedded. As predicted by the SPI model of the self, priming independent selfknowledge induced a more context-independent information processing style than did activating interdependent self-knowledge. This result is in line with our assumption that self-construals do not just differ with respect to their semantic content. Rather, these self-construals coincide with different degrees of context dependency in information processing.

More important, however, the results of Study 2 rule out the alternative explanation that the effect of the Trafimow et al. (1991, 1997) manipulation can be traced back to general mindsets being induced by focusing on differences or similarities without any relation to the self being necessary. If participants focused on differences or similarities in a nonself-related way (i.e., if they thought about cats and dogs), no effect on the degree of context dependency in information processing was observed. Together, the results confirm the central hypothesis of the SPI model: Semantic consequences and procedural effects of self-construal activation are linked by an interface. Activating self-knowledge arising from independent or interdependent semantic content areas results in different procedural modes of thinking.

Study 2 further substantiates the SPI model, because priming independent (vs. interdependent) self-knowledge resulted in lower self-rated context dependency. Using the Self-Construal Scale items to assess the context dependency of the self, our manipulation proved to be effective. Again, it is not thinking about differences versus similarities per se that produced this effect. If participants focused on differences versus similarities in a nonself-related way, no effect on the judged context dependency of the self was observed.

However, both the directly rated context dependency of the self and the results on the EFT indicate an unexpected asymmetry of

the two priming manipulations. As compared with the no-prime condition, activating independent self-knowledge tended to have stronger effects than did the interdependence priming. This finding, though not statistically significant, is not in line with our prediction. One possible reason for this tendency is that the independence priming is beneficial for solving the EFT items, whereas the interdependence priming is adverse to this goal. Participants were instructed to try hard to solve the items. Therefore, they may have used the primed cognitive procedures only if they were effective for the task at hand. Because context-dependent thinking is adverse to the EFT, participants' motivation to try hard to solve the test items may have counteracted the priming effect. It is as if the activated modes of thinking resembled cognitive tools for the present task. Because only the independent priming provides a useful tool, its effects can be observed. This interpretation, however, remains speculative.

Together, the results of Study 2 strongly support the notion of a semantic-procedural interface of self-knowledge, as proposed in our model. However, there is still one further alternative explanation that we need to rule out before we can convincingly draw this conclusion. Trafimow et al. (1991) showed that while thinking about what makes them different from their families and friends, participants in the independence priming condition generated traitlike self-descriptions. Perhaps these participants activated selfconstruals like "I am intelligent" or "I am ambitious." These self-aspects may be linked to the achievement motive to do well on a given task. Participants in the independence-priming condition, therefore, may have tried harder to solve the EFT items than participants in the interdependence-priming condition did.

This alternative motivational explanation would predict that participants primed for independence are better on any given test, irrespective of the degree of context dependency in information processing required for the task at hand. Following our reasoning, however, priming independent self-knowledge should be beneficial only if context-independent information processing is advantageous. If, on the other hand, a given problem requires one to perceive objects by considering their relations to the field in which they appear, our model predicts that priming interdependent selfconstruals will be beneficial. Hence, if context-dependent thinking is necessary to solve a given task, the SPI model but not the motivational account predicts that interdependence-primed participants will outperform independence-primed ones. Study 3 was therefore designed as an *experimentum crucis* to test the SPI model's prediction against the motivational account.

Study 3

The dependent variable in Study 3 was intended to fulfill two requirements. Again, to make the higher degree of context dependency of interdependent self-knowledge become obvious, we used a dependent variable that is sensitive to the degree of context dependency but not sensitive to the semantic contents of activated self-knowledge. In addition to this requirement, context-dependent thinking should be beneficial for solving this task. We made use of the picture completion task, a subset of the Hamburg-Wechsler Intelligence Test (HAWIE-R; Tewes, 1994), which consists of 16 picture drawings. In each of these pictures, one important element is missing or wrong. The participants' task is to identify these elements as quickly as possible. For example, one picture shows a

walking man, a tree, and the shining sun in the sky. Whereas the tree casts a shadow on the ground, the person does not. Therefore, adding the person's missing shadow is the correct solution for this item. Another picture shows a woman looking into a mirror. However, the woman and her mirror image do not correspond to each other: Whereas the actual woman is raising her arm to adjust her makeup, her arm's image is missing in the picture reflected by the mirror.

To identify these mistakes, context-dependent thinking is required. For instance, to identify the missing shadow, participants must relate the walking man to the context constituted by the sun and the tree. Focusing on the objects only and not on their relations would, therefore, be disadvantageous for solving this item. Similarly, participants must relate the woman and her mirror image to each other to identify their incongruity. Hence, because context-dependent thinking is required to solve these tasks, we expected interdependence-primed participants to outperform the independence-primed participants.

Method

Participants. Study 3 was conducted in individual sessions with 52 undergraduates (37 male, 15 female) from the Technical University of Berlin, who were randomly assigned to the experimental conditions.

Procedure and materials. As in the previous studies, the instructions for the priming task and the dependent variable were given in the beginning of the experiment. We primed independent or interdependent self-construals by having our participants think about either differences from or similarities to their family and friends. We explained the HAWIE-R test by presenting an example picture showing a door without its handle. Participants were informed that their task was to identify the missing or wrong element in a series of 16 similar pictures as quickly as possible. They were allowed to skip an item if they were not able to solve it. However, they were instructed to solve as many of the picture items as possible within the given time. After the instructions were given, participants first worked on the priming task and were then given 90 s to solve the HAWIE-R items.

Results and Discussion

For each participant, we counted the number of correctly solved items out of the total of 16. These scores were submitted to a 2 (priming) X 2 (gender) ANOVA. Whereas the latter factor had no effect ($F < 1$), priming independent or interdependent self-knowledge influenced the participants' ability to identify the missing or wrong elements in the pictures, $F(1, 48) = 3.86$, $p = .05$. Interdependence-primed participants were able to solve more items ($M = 10.4$, $SD = 2.5$) than were participants primed for independence ($M = 9.26$, $SD = 2.67$).

As predicted by the SPI model, interdependent self-construals coincided with context-dependent thinking. In this mode of thought, individuals perceive objects by relating them to the contexts in which they are presented. This information processing style is beneficial for solving the HAWIE-R-items, because the missing or wrong elements in the pictures can only be detected when they are perceived by relating them to their contexts.

The finding of Study 3 has two important implications for our argument. First, it gives further evidence for our central hypothesis that priming self-construals arising from different semantic content areas triggers the different modes of thinking that are associated with these content areas. It is important to note that, as in the case

of the EFT, this effect cannot be explained by semantic priming, because there is no semantic relation between the respective self-construals and the HAWIE-R test items. More important, however, the results of Study 3 allow us to reject the alternative explanation that priming independent self-knowledge increases the participants' motivation to do well on a given test. According to the motivational account, priming independent self-knowledge should result in better performance on any test, irrespective of the degree of context dependency in information processing required for the task at hand. The SPI model, on the contrary, predicts differential effects on cognitive tasks that require either context-dependent or context-independent modes of thought.

Study 4

Although Studies 2 and 3 ruled out two alternative explanations for the effect of Trafimow et al.'s (1991, 1997) priming effect, we conducted a fourth study to test the SPI model's prediction in the strictest way possible. Such a test of this hypothesis requires a semantic priming technique, which is more parallel with respect to the cognitive procedure participants use while engaging in the priming task. Specifically, we adopted the technique developed by Gardner and her associates (Brewer & Gardner, 1996; Gardner et al., 1999), in which participants read a short paragraph and circled all pronouns in it. We varied the type of pronouns in the text between independent (*I, me, mine*, etc.) and interdependent (*we, our, us*, etc.) to prime different self-construals. This priming technique is more neutral with respect to the cognitive activities participants are engaged in, as compared with Trafimow et al.'s (1991, 1997) task.

In addition, we included two control conditions to rule out the possibility that singular versus plural pronouns themselves triggered context-dependent or context-independent cognitive modes. In one control condition, we used third person singular pronouns (e.g., *she, he, her, his*) and in the second condition we used third person plural pronouns (e.g., *they, their*). We expected that priming independent self-knowledge would facilitate identifying embedded figures compared with priming interdependent self-knowledge, whereas we expected no difference between the control groups.

Method

Participants. Research participants were recruited on campus at the University of Michigan on a volunteer basis. Thirty-four women and 26 men served as participants and received a chocolate bar for compensation. They were randomly assigned to one of the four conditions.

Procedure and materials. The experiment was presented as two independent studies on visual perception, each consisting of two visual recognition tasks. First the experimenter explained both the pronoun task and the EFT to minimize the delay between the priming task and measurement of the dependent variable. The participants' task in the priming procedure was to read a short paragraph about a trip to a city and circle all pronouns in the text.

The conditions designed to activate self-knowledge were borrowed from Gardner et al. (1999). In particular, half of the participants ($n = 15$) received the text with independent pronouns (*I, me, mine*, etc.), and the other half ($n = 15$) received the text with interdependent pronouns (*we, our, ours*, etc.). In the control conditions, the pronouns were either third person plural (e.g., *they, them, their*; $n = 15$) or third person singular ($n = 15$). In this latter condition, 7 participants received the text with masculine

pronouns (*he, his, him, etc.*), and the remaining participants ($n = 8$) obtained the text with feminine pronouns (*she, her, etc.*). This latter variation was made because using only the masculine or the feminine version could have led to an activation of stereotypes of masculinity and femininity, which may be associated with independence or interdependence (cf. Cross & Madson, 1997). In summary, two factors were varied independently: The pronouns referred to either the first or the third person (Person was the factor in this case) and were either singular or plural (Number was the factor in this case).

In the independent self-knowledge priming condition, the text read as follows:

I go to the city often. My anticipation fills me as I see the skyscrapers come into view. I allow myself to explore every corner, never letting an attraction escape me. My voice fills the air and street. I see all the sights, I window shop, and everywhere I go I see my reflection looking back at me in the glass of a hundred windows. At nightfall I linger, my time in the city almost over. When finally I must leave, I do so knowing that I will soon return. The city belongs to me.

As described above, only the pronouns were changed in the other conditions. Subsequently, context dependency in information processing was measured with the EFT We again used Hom's (1962) self-administered version, as described in Study 2. The dependent variable was the number of embedded figures found within 2 min.

Results and Discussion

None of the participants was able to solve all 40 items (minimum solved = 15, maximum solved = 39). To test our prediction that priming independent self-knowledge would facilitate identifying embedded figures relative to priming interdependent self-knowledge, whereas no difference was expected between the control conditions, we computed a 2 (person: first vs. third) X 2 (number: singular vs. plural) X 2 (participants' gender) ANOVA on the number of solved items. This ANOVA revealed the expected significant interaction of the first two factors, $F(1, 56) = 5.32, p < .05$. If the pronouns were self-related (i.e., first person), participants in the independent priming condition found more embedded figures ($M = 30.93, SD = 4.09$) than did those in the interdependent condition ($M = 26.4, SD = 5.15$), $t(28) = 2.67, p < .01$. There was, however, no significant difference between the singular ($M = 25.33, SD = 5.77$) and the plural ($M = 27.4, SD = 6.79$) control conditions, $t(28) = -.89, p = .37$.

Thus, the self-related pronoun priming resulted in effects similar to those we obtained using Trafimow et al.'s (1991, 1997) priming method in the first two studies. Priming independent self-knowledge induced a more context-independent mode of thinking than was induced in the interdependent priming task. Because there was no difference in the control conditions, we can rule out the explanation that self-related priming was merely due to the singular-plural manipulation. As in Study 2, there was no reliable effect of the participants' gender in our fourth study, $F < 1$. Study 4 extends the findings of the previous experiments by using a different priming technique. The priming used in Study 4 differed less with respect to procedural aspects between the experimental conditions than did thinking about differences or similarities with one's family and friends. To this extent, Study 4 provides a stricter test of the proposed model than do Studies 1-3.

General Discussion

In the present article, we have proposed the SPI model of the self. According to this model, independent and interdependent self-construals differ in two ways. First, they arise from different semantic content areas. Because highly accessible semantic categories are applied to information processing, judgments can be expected to be assimilated toward autonomous contents if independent self-knowledge is accessible and toward social semantic implications if interdependent self-knowledge is accessible. This mechanism is, however, not the only one by which the self influences ongoing information processing. In addition to this semantic application effect, different procedural modes of thinking proceed from the acquisition of independent and interdependent self-construals. The development of independent self-construals requires cognitive procedures by which the self-descriptive features are aggregated across the various contexts one encounters. On the other hand, relating the self to specific social contexts in which significant others are encountered is a necessary prerequisite for developing interdependent self-knowledge. Hence, independent and interdependent self-construals are acquired using cognitive procedures that vary with respect to their context dependency. Cognitive residues of these procedures are assumed to coincide with the respective self-construals. The independent view of the self is associated with a context-independent mode of thinking (i.e., the tendency to process stimuli unaffected by the context in which they appear). Interdependent self-construals, on the other hand, coincide with a context-bound mode of thinking (i.e., the tendency to process stimuli while attending to their relations to the entire field). The central hypothesis of the SPI model is that semantic and procedural application effects, of independent and interdependent self-construals are linked by an interface. This notion implies that both mechanisms can influence ongoing information processing simultaneously. In addition, this notion predicts that if the accessibility of semantic self-knowledge of one kind or the other is increased, the associated mode of thinking is provided at the same time.

We have tested and replicated this hypothesis in four studies. To show that the effects of priming independent versus interdependent self-construals cannot also be explained in terms of semantic priming, we used dependent variables that are sensitive to the degree of context dependency in information processing but insensitive to the activated semantic contents. Study 1 gave initial evidence for the SPI model, showing that thinking about differences from versus similarities to one's family and friends affects context dependency in information processing on the EFT. Study 2 replicated this effect and ruled out the alternative explanation that the observed effects of Trafimow et al.'s (1991, 1997) method of priming can be traced back to general mindsets: Thinking about differences or similarities in a nonself-related manner did not affect the results on the EFT. Study 3 ruled out the alternative assumption that priming independent self-knowledge increases the participants' motivation to do well on any given test. Interdependence-primed participants outperformed independence-primed participants, because the task at hand required context-dependent thinking. Finally, Study 4 replicated the previous findings by means of a different priming technique that was more strict in the sense that solely independent or interdependent self-knowledge was activated while the cognitive procedures in which

participants engaged were kept constant. In summary, the results of our studies confirm the central hypothesis that differences in the semantic content areas from which independent and interdependent self-construals arise are linked by an interface to differences in the cognitive procedures with which they are associated.

Although Markus and Kitayama's (1991) suggestions have been highly influential, one of their speculations has not yet received the full attention it deserves. This is the speculation that "if one perceives oneself as embedded within a larger context of which one is an interdependent part, it is likely that other objects or events will be perceived in a similar way" (p. 246). The present studies confirm this speculation.

The EFT was developed to measure a person's degree of field dependence. This construct is conceptualized as a cognitive style. Cognitive styles are defined as "the characteristic, self-consistent modes of functioning which individuals show in their perceptual and intellectual activities" (Witkin et al., 1971, p. 3) or as "people's characteristic and typically preferred modes of processing information" (Sternberg & Grigorenko, 1997, p. 700). These quotes illustrate that cognitive styles are typically viewed as relatively stable personality traits. Our results show, however, that a person's field dependence can be influenced by subtle manipulations of the accessibility of different self-construals. Previous research has produced contradicting evidence as to whether cognitive styles are predictive of a person's academic success (see Grigorenko & Sternberg, 1997, for a review). If, as the results of our studies suggest, cognitive styles vary according to contextual changes, this may explain why several studies have failed to predict any long-term, achievement-related consequences.

Our results also suggest that relatively stable differences in the degree of field dependency between different social groups may be explained by the chronic accessibility of different self-construals for the members of these groups. Replicating the results of previous studies (e.g., Hou, Zhang, Wu, & Sen, 1997), in Study 1, women obtained higher degrees of field dependency than men did. This difference can possibly be explained by interdependent self-construals being chronically more accessible for women than for men. Cross and Madson (1997) have discussed a variety of gender differences under this perspective of self-construal differentiation, arguing that men and women live within contexts of independence and interdependence, respectively. However, the mechanism by which the self-construals of men and women guide their cognition and behavior is still an open question. Our results may potentially be relevant for making a step toward explaining these mechanisms in more detail, as we have disentangled semantic and procedural consequences of accessible self-construals.

In our experiments, we found a gender difference in field dependency only in Study 1; there was no such effect in the remaining studies. These inconsistencies reflect previous research findings insofar as some studies have found men to be less field dependent than women are (e.g., Hou et al., 1997), whereas others (e.g., Engelbrecht & Natzel, 1997) failed to obtain this gender difference (see Voyer et al., 1995, for a recent review).

Our results may also provide a theoretically interesting explanation as to why some studies failed to show the gender difference in field dependence that others had reported. If gender differences can be traced back to the relative accessibility of independent and interdependent self-construals, situational self-knowledge priming should affect the strength of observed differences between men

and women. Therefore, even subtle contextual influences on the accessibility of independent versus interdependent self-knowledge may have affected the strength of observed gender differences in previous studies. The present research was not designed to test these assumptions. We focused on the consequences of situational priming of independent versus interdependent self-construals. If, however, both chronic and situational factors affect a person's field dependence, future research should investigate the simultaneous effects of the different sources of self-construal activation.

Gender differences in the degree of field dependence are not the only interindividual differences that can be traced back to independent or interdependent self-knowledge being highly accessible over time. By the same token, differences in the degree of field dependence between cultural groups may be traced back to differences in the relative accessibility of independent and interdependent self-construals in the respective culture members. In fact, several studies have shown that despite substantial variations in the degree of field dependence usually found within cultures, members of individualist countries on average score higher on field independence (Kühnen et al., in press; Witkin & Berry, 1975; see Berry, 1991, for a review). Witkin and Berry (1975) have argued that having a field-dependent cognitive style correlates with high social competence and may stem from being closely related to the social world. Being field independent, however, is correlated with a high degree of autonomy from social circumstances. Whereas the exact cognitive mechanism by which culture affects a person's field dependence remained unexplained in Witkin's work, our results suggest that culture affects human cognition in that it consistently activates culture-specific self-construals that are associated with different modes of thinking.

The present findings underline the notion that a person's view of the self may be the key variable in understanding how culture influences individual experience. In addition, we believe that our results profoundly challenge cross-cultural research. Whenever observed differences between individualist and collectivist culture members have been explained by the different natures of the self, the two mechanisms by which independent and interdependent self-construals influence cognition and behavior, as specified in the SPI model and disentangled in our studies, have been confounded.

As we outlined in the beginning of this article, the idea that cultures vary according to how far their members take contextual features into account and are influenced by them is not new (see Choi et al., 1999; Markus et al., 1997, for reviews). In particular, the clear distinction between the person and the situation in Western thinking, combined with the strong emphasis on defining individuality in terms of internal features, leads to what Ross and Nisbett (1991) have called "lay dispositionism". This term refers to various tendencies and inferential failings one makes when attributing one's own and others' behaviors. Dispositional reasoning (i.e., the tendency to overestimate factors within the acting person relative to situational factors) leads one to see behavior as being guided by stable features of the acting individual generalized across different social situations, thus reflecting a context-independent mode of thinking.

To the extent that individuality is defined in terms of relationships with others and is therefore construed with reference to the specific context in which one meets significant others, members of collectivist cultures are less likely to show signs of dispositional

thinking (see Fiske et al. 1998, for a review). In contrast, collectivist culture members focus on the whole context of behavior, a tendency Choi et al. (1999) called "situationism or contextualism" (p.48). These authors argued that in Western philosophy, from the time of Aristotle on, an analytic way of thinking is characterized by

paying attention primarily to the object, categorizing it on the basis of its attributes, and attributing causality to the objects based on rules about its category membership (Lloyd, 1990; Nakamura, 1985). In contrast, East Asian thinking is characterized by perceiving and reasoning holistically, attending to the field in which objects are embedded, and attributing causality to interactions between the object and the field. (p. 48)

In contrast to the more philosophical account that Choi et al. (1999) have presented, our proposed SPI model points to the fact that these differences may be explained by two different mechanisms related to the construction of the self. One possible mechanism refers to the different content areas from which independent and interdependent self-construals stem. Because members of individualist cultures typically define the self in terms of traits, these highly accessible dispositional categories may be used as a basis for interpreting observed behaviors, with judgments being assimilated to the semantic content of the highly accessible trait categories. To the extent that such traitlike constructs are less accessible for collectivist culture members, they are less likely to show signs of dispositional thinking, as semantic priming research suggests. As suggested by the present model, a second explanation for this difference is that if a person's preferred cognitive mode is context independent, he or she processes stimuli as if they were unaffected by the context in which they appear. Applied to attribution research, this cognitive mode may result in a preference for dispositional attributions. Therefore, differences in the degree of lay dispositionalism between individualist and collectivist culture members may be explained by both semantic and procedural effects of highly accessible construals of identity for their members. The SPI model challenges further cross-cultural research in the following way: Whenever observed differences between members of individualist and collectivist cultures are explained with reference to the nature of construing identity within these cultures, semantic effects of highly accessible self-construals and procedural consequences of cognitive modes associated with them are naturally confounded. Therefore, tracing cross-cultural findings back to differences in construing identity within these cultures will remain an ambiguous explanation until further attempts have been made to disentangle semantic and procedural consequences of highly accessible self-knowledge.

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