DR. JINKYUNG NA (Orcid ID : 0000-0002-7100-9606)

Article type : Original Manuscript

Culture and personality revisited: Behavioral profiles and within-person stability in interdependent (vs. independent) social orientation and holistic (vs. analytic) cognitive style

Jinkyung Na [1]

Igor Grossmann [2]

Michael E. W. Varnum [3]

Mayumi Karasawa [4]

Youngwon Cho[1]

Shinobu Kitayama [5]

Richard E. Nisbett [5]

[1] Sogang University

[2] University of Waterloo

[3] Arizona State University

[4] Tokyo Women's Christian University

[5] University of Michigan

Correspondence should be addressed to either Jinkyung Na (jinkyung@sogang.ac.kr), Department of Psychology, Sogang University, 35 Baekbeom-ro, Mapo-gu, Seoul 04107, Korea,

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/JOPY.12536

or Igor Grossmann (igrossma@uwaterloo.ca), Department of Psychology, University of Waterloo, 200 University Avenue West, Waterloo, ON, N2L 3G1, Canada.

Abstract

Objective: We test the proposition that both social orientation and cognitive style are constructs consisting of loosely related attributes. Thus, measures of each construct should weakly correlate among themselves, forming intra-individually stable profiles across measures over time.

Method: Study 1 tested diverse samples of Americans ($N = 233$) and Japanese ($N = 433$) with a wide range of measures of social orientation and cognitive style to explore correlations among these measures in a cross-cultural context, using demographically heterogeneous samples. Study 2 recruited a new sample of 485 Americans and Canadians and examined their profiles on measures of social orientation and cognitive style twice, one month apart, to assess the stability of individual profiles using these variables.

Results: Despite finding typical cross-cultural differences, Study 1 demonstrated negligible correlations both among measures of social orientation and among measures of cognitive style. Study 2 demonstrated stable intra-individual behavioral profiles across measures capturing idiosyncratic patters of social orientation and cognitive style, despite negligible correlations among the same measures.

Conclusion: The results provide support for the behavioral profile approach to conceptualizing social orientation and cognitive style, highlighting the need to assess intra-individual stability of psychological constructs in cross-cultural research.

Keywords

Social Orientation, Cognitive Style, Cultural differences, Individual differences

Psychological scientists tend to conceptualize culture from two distinct perspectives. On the one hand, cross-cultural researchers have assumed that culture is personality writ large, and have aimed to identify unitary constructs to assess individual differences *across* different cultures (Harris, 1979; Skinner, 1938; Smith & Bond, 1998). On the other hand, cultural psychologists have focused on specifics of psychological processes *within* a given culture, opposing the idea that cultural differences are reducible to a handful of individual differences (Malinowski, 1992; Shweder, 1991; Wundt, 1888). Despite fundamental differences between cross-cultural and cultural psychologists, researchers from both traditions have shown an

increasing interest in the same two cultural constructs: social orientation, namely independence vs. interdependence[1] (ie.g. the relative importance of self in relation to others; Markus & Kitayama, 1991; Triandis, 1989) and cognitive style (e.g, the degree to which contexts are considered in reasoning; Nisbett, Peng, Choi, & Norenzayan, 2001; Witkin & Goodenough, 1981).

Recently, the validity of these constructs was called into a question, with a handful of studies demonstrating that measures of social orientation do not correlate among themselves nor do measures of cognitive style correlate among themselves (Dong, Talhelm, & Ren, 2018; Kitayama, Park, Servincer, Karasawa, & Uskul, 2009; Na et al., 2010; San Martin, Schug, & Maddux, 2019). Following on this initial work, we attempted to systematically evaluate the correlations among measures of social orientation and among measures of cognitive style. We also aimed to explore new ways to conceptualize social orientation and cognitive style through the lens of behavioral profiles.

Social orientation and cognitive style

Ideas concerning social orientation and cognitive style can be traced to the late 19th century. For instance, Tönnies (1887/1988) described human relationship patterns in terms of one's social orientation toward a community vs. one's self-interest. Contemporary definitions of social orientation similarly focus on the relative importance of one's group vs. the self (Markus & Kitayama, 1991; Triandis, 1989; Varnum, Grossmann, Kitayama, & Nisbett, 2010). This definition has been applied to characterize cultural differences in emotion, motivation and the self, with some cultures favoring *interdependence* –viewing the self as connected to others and emphasizing harmonious relations with others – and other cultures favoring independence – viewing the self as separate from others and emphasizing uniqueness (Markus & Kitayama, 1991).

Another major difference between cultures is holistic vs. analytic cognitive style characterized as preference for contextualized vs. decontextualized cognition (Nisbett et al., 2001; Varnum et al., 2010; Witkin & Goodenough, 1981). This distinction can be traced back to William James, who distinguished between associative and rule-governed reasoning (1890/1950).

[1] Also referred to as individualism-collectivism (Hofstede, 1980; Triandis, 1989) or Gesellschaft vs. Gemeinschaft (Greenfield, 2009). We use social orientation as a broad term that encompasses values, motivations, emotions, and behavioral tendencies.

The notion of cognitive style has been applied to characterize cultural differences in social cognition, with some cultures preferring a *holistic* cognitive style – focusing on the larger context and attending to similarities and relationships – and other cultures preferring an *analytic* cognitive style – separating a focal object from its context and reasoning about it using categories and rules (Nisbett et al., 2001).

Using these characterizations of social orientation and cognitive style, researchers have documented a wide range of group-level differences. East Asians are relatively interdependent and holistic as compared to Americans (Markus & Kitayama, 1991; Nisbett et al., 2001). Eastern Europeans are relatively interdependent and holistic as compared to Western Europeans (Kühnen et al., 2001; Varnum, Grossmann, Katunar, Kitayama, & Nisbett, 2008), who are in turn more interdependent and holistic than North Americans (Kitayama et al., 2009). Similar variations occur within countries. Southern Italians are relatively more interdependent and holistic than Northern Italians (2007) and Japanese from Hokkaido (a northern island) are relatively more independent and analytic than mainland Japanese (Kitayama et al., 2006). Likewise, people from middle-class backgrounds are more independent and analytic than people from working-class backgrounds (Grossmann & Varnum, 2011; Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012; Stephens, Fryberg, & Markus, 2011; Varnum, Na, Murata, & Kitayama, 2012).

Social orientation and cognitive style: Unitary construct vs. behavioral profile perspectives

A noteworthy development in cross-cultural research concerns treating both social orientation and cognitive style as unitary constructs that are defined by a mutually correlated network of features (Choi, Koo, & Choi, 2007; Singelis, 1994; Triandis, 1996). That is, some scholars assume that a single task with decent reliability would be sufficient for assessing individual differences in these constructs. For example, an individual whose score was higher on one type of task measuring interdependence would be expected to have a higher score on every other task measuring interdependence. This view is rooted in differential psychology (e.g., theorizing about the *g*-factor in research on cognitive abilities; Allport & Odbert, 1936; Eysenck, 1990; McCrae & Costa, 1999). From this perspective, one's scores on a single task of a construct would predict one's scores in other measures of the same construct.

Unitary construct perspective is not the only way to conceptualize individual differences. An alternative, *behavioral profile* perspective suggests that individual differences in either social orientation or cognitive style might consist of loosely connected, cross-temporally stable sub-

domains of broader constructs that successfully differentiate cultures. We elaborate on this perspective below.

Several contemporary models of individual differences suggest that personality is best viewed through the lens of situationally-contingent profiles (Fleeson, 2007; Furr & Funder, 2004; Mischel & Shoda, 1995). In this view, personality characteristics may be expressed differently from one situation to the next, resulting in low consistency *across* situations but high consistency *within* the same situation across time. Thus, reliable cross-situational profiles can emerge. In these theoretical models, variability is not regarded as a random error. Instead, these models suggest that the variability can be systematic, reflecting stable profiles of one's behaviors across various situations (Furr, 2009; Shoda, Mischel, & Wright, 1994). For example, Person A may be aggressive at a party and would also be aggressive at another similar party (measured with a "party aggression" instrument) although the person may not be aggressive in a different situation, such as at work (a tendency which might be measured with a "work aggression" instrument). In contrast, Person B may be consistently aggressive at work, but not at all aggressive during social gatherings. As a consequence, distinct and stable behavioral profiles of Person A and Person B would yield negligible correlations between these "aggression" measures when aggregating responses across multiple individuals.

Just as within-person variability across different situations is an integral aspect of one's personality system, so too could within-person variability across measures be an important aspect of one's cultural orientation. Specifically, different situations require different psychological skills or propensities, which allows for within-person variability in the personality system. Likewise, different measures of social orientation or cognitive style recruit different types of psychological skills or propensities, which leads to within-person variability across measures. Notably, measures of social orientation/cognitive style capture a wide range of ways people use to navigate their culture. For social orientation, measures include the representation of emotions, self-views, emotional reactivity, or adherence to social norms. For cognitive style, measures include attention, memory, and higher-order reasoning. Therefore, unique profiles of satisfying the culture-specific ways of being can exist depending on personality traits, different types of skills, exposure to idiosyncratic cultural niches, and preferences for some aspects of a culture rather than others. For one person, this may include emphasizing the self, but ignoring emotional reactivity, whereas for another person, it may be about adhering to social norms, with

a weaker focus on one's self. Importantly, such profiles may remain stable over time. As a consequence, performance on measures of social orientation (or cognitive style) may show weak consistency across tasks at a given time point, while simultaneously forming cross-temporally stable behavioral profiles. An empirical test of this proposition requires examining whether one's profiles of responses to various measures of social orientation / cognitive style would be stable *across time points*.

Past research reveals an isomorphic puzzle of social orientation and cognitive style

A handful of studies have begun to explore the construct-related nature of social orientation and cognitive style. Results from these studies reveal that measures within each ostensible construct of social orientation or cognitive style are negligibly correlated. Kitayama and colleagues (2009) administered four social-orientation and two cognitive-style measures in four different cultures (the US, UK, Germany, & Japan) and found that measures did not correlate among themselves within each culture. Building on this initial demonstration, Na and colleagues (2010) used a wide range of measures of social orientation and cognitive style in the US and found that correlations among measures of each construct were negligible, even though these measures systematically differentiated working class participants from middle-class participants. The negligible cross-measures correlations suggested that individual differences in social orientation and cognitive style do not represent distinct unitary constructs.

Na et al. (2010) also demonstrated the lack of isomorphism (i.e., the differences between individual level and cultural level): Examination of cognitive style scores on two tasks collected in five countries (Croatia, Germany, Japan, UK, and the US) revealed substantial correlations on the group level (r = .82), despite negligible individual-level correlations within each country. This lack of isomorphism across individual and cultural levels is consistent with earlier theories in cross-cultural research (Hofstede, 1980; Schwartz, 1994). Moreover, it suggests that social orientation and cognitive style do not follow the same pattern as cultural values (Fischer & Poortinga, 2012) or Big Five personality (McCrae, Terracciano, & Personality Profiles of Cultures Project, 2005), in that both of them show a convergence between individual and group levels.

Limitations of prior research

Though the initial evidence appears to suggest that neither social orientation nor cognitive style are unitary constructs, the evidence so far has been limited due to the breadth of

the tasks used (Kitayama et al., 2009) or diversity of samples (Na et al., 2010). Kitayama and colleagues employed only a small number of social cognitive tasks, whereas Na and colleagues have only tested sub-groups within the US and looked at correlations between only two measures in a handful of countries. Moreover, little is known about the cross-temporal stability of tasks themselves. It is possible that the measures do not even show *intra*-individual stability and therefore violate the ergodicity principle (Molenaar & Campbell, 2009), which states that intra-individual consistency is a necessary condition for making inter-individual inferences, including examination of relationships between measures.

Present research

We address prior limitations by systematically replicating previous observations of negligible correlations among a broad range of tasks assessing social orientation and cognitive style, respectively, on random-stratified samples of Japanese and Americans (Study 1). We selected these target cultures because of the frequency with which these groups have been used in prior research on social orientation as well as cognitive style (e.g., Markus and Kitayama, 1991; Nisbett et al., 2001). Second, we examined whether within-person variability would be stable and predictable (Study 2). Toward this end, we asked a community sample of Americans and Canadians to complete several measures of social orientation and cognitive style at different time points and examined both the stability of individual tasks, as well as the cross-temporal stability of possible behavioral profiles assessed via latent class analyses.

Study 1

Study 1 attempted to systematically probe the inter-individual associations of a range of widely-used measures of social orientation / cognitive style with diverse samples of Japanese and Americans. We expected that the correlations among measures of social orientation / cognitive style would be negligible within each culture and perhaps also when collapsing across both cultural groups.

Methods

Participants. We recruited a socio-economically diverse sample of Japanese from the Tokyo Metropolitan area ($N = 433$) and Americans from the Washtenaw Country in Michigan (N

= 233)[2] with an approximately equal number of participants of both genders and of each of three age groups (25-40, 41-59, 60-79). Detailed demographic information is summarized in Table 1.

Procedure. Participants in the US were invited to three different sessions of a two-hour study and paid $70 for each session. Participants in Japan first filled out a questionnaire packet and came in for two different laboratory sessions in return for equivalent monetary compensation. In these sessions, participants completed a range of social and cognitive tasks, selected for their success in differentiating cultural groups in prior research (see Varnum, Grossmann, Kitayama, & Nisbett, 2010, for review). Since the data were collected across three sessions and participants were allowed to skip any question they were uncomfortable with, the number of participants varies across tasks (See Table 2). We report results from six social and eleven cognitive measures previously used as markers of social orientation and cognitive style, respectively. For each measure of the social construct, larger values reflect more interdependent and less independent social orientation. For each of the cognitive construct, larger values reflect more holistic and less analytic cognitive style. For measures consisting of sub-scores, we calculated a relative score reflecting more interdependence/holistic reasoning and less independence/analytic reasoning based on prior theorizing and empirical findings (e.g., Kitayama, 2002; Na et al., 2010). Although the main analyses were based on the relative indexes, we performed relevant analyses on sub-scores in the supplementary materials which yield very similar results (See STables 1 & 2). The following section describes exactly how we calculated scores for each task. Table 3 summarizes the means, standard deviations, and reliabilities of the measures. Also, we reported reliabilities of sub-scores in the case of measures with sub-scores.

Data repository. Supplemental analyses and data for both studies are posted online at https:// osf.io/hb2zg.

Measures of Independent vs. Interdependent Social Orientation

Inclusion of Other in the Self (IOS) scale. The IOS scale (Aron, Aron, & Smollan, 1992) is a pictorial measure of closeness. In the IOS scale, a series of two circles is provided where the degree of overlap between them progresses linearly, creating a seven-point scale of relational

[2] Originally, we recruited participants over 79 years of age in the US (n = 12). For the sake of comparability with the Japanese sample, we excluded them from the analyses. Results remain virtually identical if including this sub-sample). Analyses on the American samples were previously reported in Na et al. (2010).

closeness. Participants selected one pair of circles that best represents their relationships with family members.

Intensity of Engaged Emotion. This measure was computed from the Implicit Social Orientation Questionnaire (Kitayama, Mesquita, & Karasawa, 2006). In this questionnaire, participants were asked to remember 10 social episodes (e.g. "when I had a positive interaction with friends) and indicate the intensity of experiencing each of 12 emotions. Among those emotions, three different types were embedded: general positive emotions (e.g., happiness), socially engaged positive emotions (e.g., friendly feeling), & socially disengaged positive emotions (e.g., personal pride). We calculated the relative intensity of experiencing engaged vs. disengaged emotions as an index of the relative importance of social relations. The score was the average of engaged minus disengaged emotions across ten episodes.

Predictors of Happiness. This measure was also computed from the Implicit Social Orientation Questionnaire (Kitayama, Mesquita, & Karasawa, 2006). In this measure, we examined the relative effects of socially engaged emotions vs. socially disengaged emotions on happiness. The score was the regression coefficients predicting general positive emotions as a function of socially engaged vs. socially disengaged emotions. To the extent that they view themselves as connected to others, socially engaged emotions would be more associated with happiness more than socially disengaged emotions.

Self-inflation. We calculated this measure following the guidelines of the Sociogram task (Duffy, Uchida, & Kitayama, 2013). In the task, participants were asked to draw their social network by using circles to represent the self and others. We calculated the size (i.e., diameter) of the self-circle relative to the other-circles as an index of self-inflation. The score was calculated by dividing the size of self-circle by the average size of other circles while controlling for the overall area of the drawing (defined by the outer horizontal and vertical margins).

Vocal Stroop task. In the Vocal Stroop task, words that are either positive (e.g., "wedding") or negative (e.g., "funeral") are pronounced in either an emotionally positive or negative tone (Kitayama & Ishii, 2002). Participants were asked to judge whether each word is positive or negative and we measured the reaction time for congruent trials (positive words in positive tone or negative words in negative tone) and incongruent trials (positive words in negative tones or negative words in positive tones) as an index of their sensitivity to social cues.

The score was the interference effect of vocal tone: reaction times for incongruent trials (e.g., "wedding" in a negative tone) minus the congruent trials (e.g., "wedding" in a positive tone).

Self-Construal scale. In the Self-Construal scale (Singelis, 1994), participants indicated how much they agreed with ten independent (e.g. "I always try to have my own opinions") and ten interdependent statements (e.g., "I am concerned about what people think of me"). The score was ratings of interdependent statements minus those of independent statements.

Measures of Analytic vs. Holistic Cognitive Style

Inclusion task. The task investigated the amount of information participants considered before making the final attribution (Choi, Dalal, Kim-Prieto, & Park, 2003). In the task, participants imagined that they were a detective investigating a murder case. Participants received 97 clues that may or may not be relevant to the case (e.g., the number of pets the victim owned and the victim's history of sexual abuse by his/her parents) with a task to exclude clues which they thought were causally irrelevant. The score was the number of items that participant thought was causally relevant to the event.

Proverb task. The task measured whether people preferred dialectical (holistic) vs. linear (analytic) reasoning (Peng & Nisbett, 1999). Participants read eight dialectical ("Too humble is half proud") and eight non-dialectical ("One against all is certain to fall") proverbs, reporting their preferences for each proverb on a 7-point scale (1 = *Not at all* to 7 = *Very much*). The score was the relative preference for dialectical proverbs vs. the non-dialectical proverbs.

Change task. This task measured how much participants thought that contradictory events depicted in a written scenario (e.g., people who fought as children might become lovers as adults or a person who grew up in a low-income family might become rich) was likely to happen in the future (Ji, Nisbett, & Su, 2001). To the extent that participant based their reasoning on focal information (i.e., the current status), they believe that a future event that is contradictory to the current status would be less likely to happen. There were eight scenarios, and participants were asked to estimate a probability for each scenario (0-100 %).

Triad task. The task examined whether participants categorized 14 objects based on a thematic relation vs. focal attributes (Chiu, 1972). For each object (e.g., “a cow”), participants chose one of two alternatives (e.g., “chicken” vs. “grass”). One alternative was thematically related to the target (e.g., grass) and the other belonged to the same taxonomic category as the target (e.g., chicken). The final score concerned the number of thematic categorizations.

Causal Attribution Task. The task examined the extent to which participants attributed the causality to an actor vs. the context (Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006). Specifically, participants read four vignettes describing either positive or negative behavior of a target (two positive vignettes and two negative vignettes). For each vignette, they indicated their level of agreement with two items reflecting dispositional attribution and two items reflecting situational attribution on a 7-point scale (1: Strongly Disagree to 7: Strongly Agree). Following prior research, the final score concerned participants' ratings for situational attributions minus those for dispositional attributions (Kitayama et al., 2006).

Outside-in task. The task measured whether participants took a third person (holistic) or a first person (analytic) perspective when they thought about their past experience (Cohen & Gunz, 2002). First, participants recalled a specific instance of two social situations (when you had a conversation with a friend or when you were embarrassed). Next, they indicated whether the memory was a first-person memory or a third-person memory on an 11-point scale (1 = *Entirely first-person memory* to 11 = *Entirely third-person memory*).

Framed Line Test (FLT). The FLT measured how easily participants ignored vs. took into account contextual information (Kitayama, Duffy, Kawamura, & Larsen, 2003). In this task, participants saw a square with a line drawn inside it and were asked to reproduce the line inside a new square of a different size either by duplicating its absolute length (ignoring the context of the square) or its length relative to the square (by drawing a line with the same proportion as in the original square). The score was the error in millimeters for the absolute judgments minus the error in millimeters for the relative judgments.

Change Blindness task. The task examined how easily participants detected changes in focal vs. backgrounds objects in order to measure whether they paid attention to focal vs. background objects (Masuda & Nisbett, 2006). Specifically, participants watched four pairs of animated scenes, such as a construction site and an airport. Each scene pair consisted of two similar, but slightly different vignettes, and participants were asked to detect the difference between them. The number of changes noticed in focal objects and contexts was counted. Following prior research, the final score was the frequency of contextual changes noticed minus the frequency of focal object changes noticed (Masuda & Nisbett, 2006). Note that both Japanese and American participants detected more changes in the context than in focal objects. One may assume that, if Americans are analytic, then they should always detect more changes in focal

objects than in the context. However, if focal objects are not salient enough, even Americans may not be attracted by them. In other words, one's tendency to attend to focal vs. background objects is reflected in the relative difference between focal and background changes. A similar logic applies to two other measures described below.

Underwater Animations task. Participants watched eight animated vignettes of fish and were asked to recall what they saw after seeing each vignette. As in the narrative task, we counted the number of statements about focal objects (i.e., focal fish) and background objects or the context. The final score concerned the frequency that participants mentioned the context minus the frequency they mentioned focal fish.

Narrative task. The task examined whether participants paid attention to the main character vs. other supporting characters (Chua, Leu, & Nisbett, 2005). In this task, participants watched two video clips (events at Swimming Pool and Library) and read two one-page stories (about a working mother, Kathy, and a college graduate, Lea). After watching/reading each episode, participants were asked to recall what they saw or read and we counted the number of statements about focal characters and other supporting characters. The final score was the frequency that other characters were mentioned minus the frequency that focal characters were mentioned.

Twenty Statements Task. In the TST (Kuhn & McPartland, 1954), participants were asked to describe themselves in twenty different ways. The statements were coded as reflecting abstract/dispositional representation vs. concrete/contextual representation of self, following the guidelines outlined by Rhee, Uleman, Lee, and Roman (1995). For instance, decontextualized statements like "kind," "friendly," as well as universal and existential statements like "human being," or "myself" were quantified as abstract, whereas statements like "kind to my parents," "friendly to my neighbors," as well as statements representing social identity "salesperson," and preferences "like to help people" were quantified as contextualized. The score was the proportion of concrete/contextual statements.

Results

We replicated previously reported cultural differences on measures of social orientation and cognitive style. As Table 3 indicates, Japanese showed more interdependent (vs. independent) social orientation on most measures, with the cultural differences being of moderate/high magnitude ($d > .4$; except for self-inflation). Similarly, Japanese showed more holistic (vs.

analytic) cognitive style than Americans on most measures (except for FLT), with the cultural differences being of low to moderate magnitude.[3]

If coherent group differences are due to different cultural distributions of unitary constructs of social orientation and cognitive style, respectively, correlations among measures should be positive and significant. However, we observed negligible correlations for social orientation not only in the US (mean r = .05 & median r = .02) but also in Japan (mean r = .04 & median r = .05, see Table 4). These correlations did not increase when collapsing across cultural groups, mean r = .10 & median r = .07 (STable 3). Similarly, cognitive style measures did not correlate among themselves either in Japan (mean r = .03 & median r = -.004) or the US (mean r = .02 & median r = -.01, see Table 5.) Correlations were weak even when collapsed across cultures, mean r = .08 & mean r = .06 (STable 4).

Next, we conducted exploratory factor analyses (extraction: maximum likelihood) within each culture and when collapsed across cultures to further examine the coherence at the individual level. For social orientation, the first factor did not explain more variance (Japan: 17.44%, US: 17.85%; All: 19.01%) than each measure would on its own (i.e., when assuming measures are orthogonal; 17%). Results were similar for cognitive style: The variance explained by the first factor (Japan: 14.11%, US: 12.14%, All: 11.87%) was only trivially different from the standard criterion of variance explained for one measure out of eleven (9%). The first factor was driven by a single measure for both social orientation and cognitive style (see Table 6).

In sum, measures of social orientation or cognitive style showed little coherence at the individual level. The findings replicated previously reported patterns of negligible correlations for such measures among random-stratified samples of Japanese and Americans, despite significant and frequently sizable cultural differences on most of the same measures. Zero-order correlations remain negligible when measures of social orientation and cognitive style are combined (see online supplement). However, the evidence so far concerns single-shot observation of inter-individual variability across measures of ostensible constructs of social orientation and cognitive style. Thus, it is possible that lack of coherence between tasks is due to low stability of tasks – stability being a prerequisite for coherence between tasks (Molenaar &

[3] Additional information regarding cultural differences in these samples is available in Kitayama, Karasawa, Grossmann, Na, Varnum, & Nisbett (2019).

Campbell, 2009). We addressed the question of intra-individual stability in key measures of social orientation / cognitive style in Study 2.

Study 2

To investigate whether within-person variability would be predictable, Study 2 examined whether individual measures of social orientation / cognitive style are cross-temporally stable. Further, we examined the stability of the relationships between individual tasks of social orientation and cognitive style over time by probing existence and stability of behavioral profiles. Such cross-temporally stable profiles can emerge despite trivial correlations among tasks measured at a single sampling point.

Methods

Participants and procedures. We recruited 485 adults (201 males, 281 females, 1 other, & 1 no response) from the Amazon Mechanical Turk at Time 1. Any worker on the MTurk could participate in Study 2 as long as they lived in the US or Canada. They completed eight tasks (4 social orientation and 4 cognitive style tasks). All these tasks were selected based on the frequency of use in prior research as well as high internal reliability in Study 1. About one month after the initial data collection, we contacted participants and asked them to complete the same eight tasks again. Two hundred and thirty-five participants out of 485 (retention rate: 48%) participated in the second portion of Study 2 at Time 2. Both samples consisted predominantly of people of European descent (Time 1: 380 European Americans/European Canadians, 37 African Americans/Canadians, 26 Hispanic American/Canadians, 36 Asian Americans/Canadians, 5 Others, & 1 no response and Time 2: 191 European Americans/Canadians, 15 African Americans/Canadians, 12 Hispanic American/Canadians, & 17 Asians Americans/Canadians). The demographic composition of the sample did not differ significantly at Time 1 vs. Time 2 (see Table 1).

Measures of social orientation and cognitive style. We included four measures of social orientation and cognitive style, respectively. We selected these measures based on their high degree of internal stability in Study 1: Inclusion of Other in the Self scale (IOSS), Intensity of engaged vs. disengaged emotion, Predictor of happiness, the Self-construal scale for social orientation and Outside-in task, Inclusion task, Change task, and the modified Twenty Statement task (TST). These measures were administered in the same way as Study 1 except that participants were asked to describe themselves in ten different ways as opposed to twenty

different ways in the modified TST. We calculated the scores for these tasks in the same way as Study 1. Table 7 includes inter-item reliability for each multi-item task. Note that reliability was calculated for sub-scale if applicable.

Results

Internal consistency across measures. First, we examined the inter-task consistency among the distinct tasks measuring social orientation and cognitive style. As shown in Table 8, correlations among the measures of social orientation were negligible at Time 1, with the exception of a negative correlation between Engaged vs. Disengaged Emotions and Self-Construal, $r = -.182$, $p < .001$. Both mean and median correlations were close to zero, mean $r = -.036$ and median $r = -.036$. The same pattern was observed at Time 2. Specifically, most correlations were negligible, with an exception of a negative correlation between the task assessing the intensity of engaged vs. disengaged emotions and the self-construal task, $r = -.233$, $p < .001$, mean & median rs = -.024 & -.013 (Table 8).

Turning to the cognitive style tasks (Table 9), we observed a single positive correlation between the tasks measuring prediction of change and a tendency for third-person memory, $r = .127$, $p = .006$. Overall, there was a trivial degree of inter-task convergence, mean $r = .040$ and median $r = .021$. Similarly, correlations were negligible at Time 2, $-.113 < r\text{s} < .019$, mean $r = -.037$ and median $r = -.010$. To sum up, Study 2 replicated low degree of inter-individual stability among measures of social orientation and cognitive style, even among the tasks showing a conventionally moderate-high level of internal reliability.

Cross-temporal consistency. Next, we examined whether stability might be observed within each person over time despite the negligible correlations among measures representing social orientation and cognitive style. As shown on the diagonal in Table 8, for social orientation each measure was significantly correlated with itself across time points. Moreover, except for one task, the size of test-retest correlations was moderate-high, mean $r = .564$ and median $r = .592$. The task that showed a low test-retest correlation concerned a single-item prediction of happiness task, $r = .161$, $p = .015$. The single-item nature of this estimate may have resulted in the small-moderate cross-temporal consistency of this measure.

Similarly, for cognitive style each measure showed a significant degree of consistency over time, with moderate-high degree of test-retest stability, $.47 < r\text{s} < .70$ (see the diagonal in Table 9). Overall, it is clear that the lack of inter-task correlations for measures of social

orientation and measures of cognitive style is not due to low inter-temporal stability of the measures themselves.

Behavioral profiles. Lack of inter-task consistency in social orientation and cognitive style raises questions about the operationalization of these concepts as unitary constructs. However, research on individual differences suggests that such a unitary construct approach is just one of many ways to conceptualize individual differences. In particular, constructs could also be represented through a network of situationally-contingent relationships (Epskamp, Borsboom, & Fried, 2018; Fleeson & Furr, 2016; Mischel & Shoda, 1995), in turn forming latent profiles for individuals (Gabriel, Daniels, Diefendorff, & Greguras, 2015; Van den Akker, Deković, Asscher, Shiner, & Prinzie, 2013). In a similar vein, social orientation and cognitive style could be represented through a network of task-contingent relationships. Person A may score higher on the first task, but low on the second task, and moderate on the third task, whereas person B may score low on the first task, but moderate on the second task and high on the third task. Moreover, these relations might be stable across time.

To address this possibility, we estimated and tested the stability of latent profiles with help of latent class analyses (LCA) on the Time 1 and Time 2 data, separately. For the LCA, we standardized scores of each measure within each time point and selected participants who completed all the measures at both time points. Also, following the suggestion from Stevens (2012), five participants were excluded because their scores were extreme (more than 3 *SD*s above/below the mean) at one or more measures. Including these participants resulted in several classes with only one extreme participant in it. As a result, two hundred and thirty participants were analyzed in the LCA.

Individual profiles would be considered as stable if the number and shape of classes identified at Time 1 and Time 2 were similar to each other and if individuals were categorized into the same class across two time points. We performed all latent profile analyses in Mplus 7.1 (Muthén & Muthén, 2012) using robust maximum likelihood estimator. To determine the adequate number of classes, models with increasing number of classes were compared using the following indexes: 1) the Akaike information criterion (AIC), 2) the Bayesian information criterion (BIC), 3) the sample-size-adjusted Bayesian information criterion (SSA-BIC), 4) Entropy, 5) the Lo-Mendell-Rubin Adjusted Likelihood Ratio Test (LMRT), and 6) the Bootstrapped Likelihood Ration Test (BLRT). The lower values in AIC, BIC, and SSA-BIC

indicate a better fit of the model to the data (Nylund, Asparouhov, & Muthén, 2007). Entropy is a measure of classification quality, reflecting better quality as values approach 1 (Celeux & Soromenho, 1996). Finally, LMRT and BLRT indicated whether the model provided a significantly better model fit than a model with k-1 classes (Nylund et al., 2007).

First, results from four measures of social orientation generally pointed to a two-class model over the other models at both Time 1 and Time 2 (see Table 10). LMRT and BLRT indicates that the two-class model was better than the one class model, whereas the three-class model was not significantly better than the two-class model. Also, given that entropy values of .60 indicate around 80% correct classification, and entropy values of above .80 indicate 90% correct classification (Lubke & Muthén, 2007), the classification in the two-class model is considered as reasonably good. As shown in Figures 1(a) & 1(b), classes identified at Time 1 and Time were minimally different from each other. Moreover, 85% of participants (196 out of 230; 40 in Class A & 156 in Class B) were classified into the same class across two time points. That is, not only were classes identified at Time 1 and Time 2 were similar to each other; participants belonged to the same class at both time points.

We found similar results for four measures of cognitive style. Indicators in Table 10 suggest that a two-class model showed the best fit. Both LMRT and BLRT shows that the two-class model was significantly better than the one-class model. Although BLRT indicates that the three-class model was significantly better than the two-class model, we selected the two-class model over the three-class model because entropy was larger in the two-class model than the three-class model. As shown in Figure 1(c) & 1(d), classes identified at Time 1 and Time 2 are virtually the same. Also, 88% of participants (203 out of 230; 15 in Class A & 188 in Class B) belonged to the same class across two time points. Thus, we can conclude that one's behavior profile across four measure of cognitive style remained stable. We also note that a similar conclusion can be drawn from the three-class model.

To sum up, the results of Study 2 suggest that even internally reliable tasks assessing social orientation and cognitive style cannot be reduced to unitary constructs at the individual level: the inter-individual associations between the tasks were negligible. At the same time, most tasks showed at least a moderate level of intra-individual, cross-temporal stability. Moreover, both social orientation and cognitive style tasks have stable behavioral profiles: Latent Class

Analysis indicated that profiles of performance across four social orientation tasks and four cognitive style tasks, respectively, was quite stable from Time 1 to Time 2.

Discussion

In the present research, two of the most widely studied concepts in cultural psychology, namely social orientation and cognitive style, show substantial inter-individual variability across tasks ostensibly measuring the same constructs. Notably, this variability is not due to intra-individual noise. Instead, the relations between measures presented in behavioral profiles of these measures are stable over time. These insights call for a fundamental re-evaluation of assumptions among researchers interested in cultural and individual differences in these constructs in terms of both their operationalization and measurement. Below we summarize and discuss some of the implications of the present work.

First, we demonstrated that the dissociation between group- and individual-level processes holds when examining the most comprehensive set of measures of social orientation and cognitive style available to date. Specifically, Study 1 extends the observation of negligible inter-individual correlations between social orientation measures as well as between cognitive style measures (Dong et al., 2018; Kitayama et al., 2009; Marquez & Ellwanger, 2014; Na et al., 2010; San Martin et al., 2019) to more representative samples of Japanese and Americans. And yet, on most measures we replicated prior research concerning cultural differences in social orientation and cognitive style (Markus & Kitayama, 1991; Nisbett et al., 2001), observing medium-size effects with our age- and social-class-diverse samples (Henrich, Heine, & Norenzayan, 2010). Thus, despite significant group-level differences on social orientation and on cognitive style measures, there is no reason to expect inter-individual convergence between tasks for either construct. Indeed, making inferences about cross-task associations just because groups systematically vary on these tasks is a bona fide example of the ecological fallacy (the fallacy that occurs when inferences about individuals are deduced from inferences about groups to which those individuals belong; Robinson, 1950).

The second insight from the present research is that some of the key tasks claiming to measure either social orientation or cognitive style are *intra*-individually stable, and yet do not correlate with each other. This observation suggests that the lack convergence of social orientation and cognitive style tasks into unitary constructs is not due to lack of test-retest reliability of the tasks. Rather, neither social orientation nor cognitive style appear to be unitary

constructs (e.g., Campbell & Fiske, 1959), raising questions about the concepts' operationalization and measurement. Study 2 starts to shed light on one possible way to re-think these concepts. Latent profile analyses in Study 2 suggest that both social orientation and cognitive style could be described using a set of loosely inter-related behavioral profiles. A profile of loosely connected sub-components allows for substantial inter-individual variability, simultaneously remaining intra-individually stable over time.

When examining the pattern of profiles identified in Study 2, differences in two classes for social orientation appear to be largely driven by the *Inclusion-of-Others-in-the-Self* task (IOS; see Figure 1), whereas differences in two classes for cognitive style are mostly driven by the *Outside-in* and *Change* tasks (see Figure 2). To test whether these patterns would be applicable to other samples, we sought to cross-validate the results from a set of Latent Class Analyses on Japanese and American data in Study 1, including only measures equivalent to those used in Study 2. Supplementary results reported online revealed that profiles identified from Studies 1 & 2 were similar to each other in terms of overall shape and yet, there were also variations across them (see Figure S1). Though observed similarities suggest that the identified profiles in the present research may be generalized to other samples, observed differences between studies indicate that more work is necessary to systematically unpack and evaluate the stability of profiles across diverse samples.

A practical implication of this perspective for culture-relevant concepts is that a single measurement is not sufficient to characterize either cultural or individual differences in social orientation or cognitive style, as it cannot capture such latent profiles. Rather, measuring people across multiple situations appears necessary to fully capture how different people embody or do not embody broad cultural constraints and affordances (Fleeson, 2007; Furr & Funder, 2004; Mischel & Shoda, 1995).

The present work dovetails with emerging literature in social and personality psychology. In particular, research on emotion suggests that cultural differences are best understood from a perspective allowing for inter-individual variability in the ways emotions may manifest themselves (Boiger et al., 2018). For instance, there can be various types of anger, and thus, the vital question is what types of anger one experiences, not whether one experiences anger or not. Accordingly, the central question for research on culture and emotion shifts from mere presence of broad emotional categories such as anger across cultures, to the question of how different

aspects of anger may be distributed across cultures (Boiger et al., 2018). Similar to this proposition, it may be more informative to investigate how different profiles of social orientation or cognitive style are distributed across cultures than to focus solely on cultural differences in any given aspect of social orientation and cognitive style.

Before closing, we wish to highlight some important limitations in the present research. Though most measures in the present research showed acceptable degree of inter-item reliability, further measurement work is needed to further improve the reliability of the tasks, and to subsequently test the inter-individual correlations between conceptually-related tasks of social orientation or cognitive style. Also, previously developed tasks of social orientation and cognitive style vary in the measurement format: Some measures consisted of Likert-type response scales to vignettes (the *attribution task*), whereas others involved open-ended recall of visual scenes (the *change blindness task*) or measured physical features of participant-generated drawings (the *FLT*). Future work may control for the response format of tasks to test whether inter-individual correlations among measures would improve. More relevant to the present work, it appears prudent to consider emerging techniques enabling cultural psychologists to analyze one's behavior profile across different measures (e.g., Ram, Coccia, Conroy, Lorek, Orland, Pincus,… & Gerstorf, 2013). Addressing this possibility would require the generation of new instruments designed to assess various components of social orientation or cognitive style. Finally, Study 2 focused on North American participants, opening the door for exploring intra-individual stability in social orientation and cognitive style in other cultures.

Concluding remarks

For decades, social orientation and cognitive style have been at the center of the demonstration about the role of culture in thought and behavior (Grossmann & Na, 2014; Hamamura, 2012; Heine, 2010; Kitayama, Duffy, & Uchida, 2007; Markus & Kitayama, 2010; Nisbett, 2007; Norenzayan, Choi, & Peng, 2007; Tsai, 2007). The breadth of social orientation and cognitive style has allowed for detecting differences between many different groups such as gender (Kashima et al., 1995), social class (Kraus et al., 2012; Stephens, Markus, & Phillips, 2014), and ethnicity (Markus & Conner, 2013). Possibly because of such breadth, many aspects of social orientation and cognitive style appear to be only loosely related to each other. We argue that a behavioral profile approach proposed in the present research is one way to conceptualize these loosely related attributes. Moreover, we believe that such a new look at the cultural

constructs could motivate a novel program of research situating intra-individual variability in one's various psychological tendencies such as emotions, motivations and behaviors.

Declaration of Conflicts of Interest

The author(s) declared no potential conflicts of interest concerning the research, authorship, and publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and publication of this article: Preparation of this manuscript was supported by the Social Sciences and Humanities Research Council of Canada grants (grant # 435-2014-0685), as well as the Templeton Pathway to Character Project, and the Ontario Ministry of Research, Innovation and Science (Early Researcher Award) to Igor Grossmann & National Institute on Aging Grant 5RO129509-02, and National Science Foundation (NSF) Grant 2007: BCS 0717982 to Richard E. Nisbett and Shinobu Kitayama.

Acknowledgments

We thank Sonia Vintan for help with coding statements in Study 2 and William Chopik and Jochen Gebauer for comments on an earlier version of this manuscript.

References

Allport, G. W., & Odbert, H. S. (1936). Trait-names: A psycho-lexical study. *Psychological Monographs, 47*(1), i-171. doi: 10.1037/h0093360

Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology, 63*(4), 596-612.

Boiger, M., Ceulemans, E., De Leersnyder, J., Uchida, Y., Norasakkunkit, V., & Mesquita, B. (2018). Beyond essentialism: Cultural differences in emotions revisited. *Emotion, 18*(8), 1142-1162. doi: http://dx.doi.org/10.1037/emo0000390

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*(2), 81-105. doi: 10.1037/h0046016

Celeux, G., & Soromenho, G. (1996). An entropy criterion for assessing the number of clusters in a mixture model. *Journal of Classification, 13*(2), 195-212. doi: 10.1007/bf01246098

Chiu, L.-H. (1972). A cross-cultural comparison of cognitive styles in Chinese and American children. *International Journal of Psychology, 7*(4), 235-242.

Choi, I., Dalal, R., Kim-Prieto, C., & Park, H. (2003). Culture and judgment of causal relevance. *Journal of Personality and Social Psychology, 84*(1), 46-59.

Choi, I., Koo, M., & Choi, J. A. (2007). Individual differences in analytic versus holistic thinking. *Personality and Social Psychology Bulletin, 33*(5), 691-705.

Chua, H., Leu, J., & Nisbett, R. E. (2005). Diverging Views of Social Events. *Personality and Social Psychology Bulletin, 31*, 925-934.

Cohen, D., & Gunz, A. (2002). As seen by the other... Perspectives on the self in the memories and emotional perceptions of Easterners and Westerners. *Psychological Science, 13*(1), 55-59.

Dong, X., Talhelm, T., & Ren, X. (2018). Teens in Rice County Are More Interdependent and Think More Holistically Than Nearby Wheat County. *Social Psychological and Personality Science*, 1948550618808868. doi: 10.1177/1948550618808868

Duffy, S., Uchida, Y., & Kitayama, S. (2013). *Symbolic self-inflation: A cross-cultural comparison.* Rutgers University - Camden.

Epskamp, S., Borsboom, D., & Fried, E. I. (2018). Estimating psychological networks and their accuracy: A tutorial paper. *Behavior Research Methods, 50*(1), 195-212. doi: 10.3758/s13428-017-0862-1

Eysenck, H. J. (1990). Biological dimensions of personality. In L. A. Pervin (Ed.), *Handbook of Personality: Theory and research* (pp. 244 - 276). New York: Guilford.

Fleeson, W. (2007). Situation-Based Contingencies Underlying Trait-Content Manifestation in Behavior. *Journal of Personality, 75*(4), 825-862. doi: doi:10.1111/j.1467-6494.2007.00458.x

Fleeson, W., & Furr, R. M. (2016). Do broad character traits exist? Repeated assessments of individuals, not group summaries from classic experiments, provide the relevant evidence. In I. Fileva (Ed.), *Questions of Character* (pp. 231-248). Oxford University Press.

Furr, R. M. (2009). Profile analysis in person–situation integration. *Journal of Research in Personality, 43*(2), 196-207. doi: https://doi.org/10.1016/j.jrp.2008.08.002

Furr, R. M., & Funder, D. C. (2004). Situational similarity and behavioral consistency: Subjective, objective, variable-centered, and person-centered approaches. *Journal of Research in Personality, 38*(5), 421-447. doi: https://doi.org/10.1016/j.jrp.2003.10.001

Gabriel, A. S., Daniels, M. A., Diefendorff, J. M., & Greguras, G. J. (2015). Emotional labor actors: A latent profile analysis of emotional labor strategies. *Journal of Applied Psychology, 100*(3), 863-879. doi: http://dx.doi.org/10.1037/a0037408

Greenfield, P. M. (2009). Linking social change and developmental change: Shifting pathways of human development. *Developmental Psychology, 45*(2), 401-418. doi: http://dx.doi.org/10.1037/a0014726

Grossmann, I., & Na, J. (2014). Research in culture and psychology: past lessons and future challenges. *WIREs Cognitive Science, 5*, 1-14. doi: 10.1002/wcs.1267

Grossmann, I., & Varnum, M. E. W. (2011). Social class, culture, and cognition. *Social Psychological and Personality Science, 2*(1), 81-89. doi: 10.1177/1948550610377119

Hamamura, T. (2012). Are Cultures Becoming Individualistic? A Cross-Temporal Comparison of Individualism–Collectivism in the United States and Japan. *Personality and Social Psychology Review, 16*(1), 3-24. doi: 10.1177/1088868311411587

Harris, M. (1979). *Cultural materialism: The struggle for a science of culture*. New York: Vintage.

Heine, S. J. (2010). Cultural Psychology. In S. T. Fiske, D. T. Gilbert & G. Lindzey (Eds.), *Handbook of Social Psychology*: Wiley.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*(2-3), 61-83.

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Beverly Hills: Sage.

James, W. (1890/1950). *Principles of psychology*. New York: Holt.

Ji, L.-J., Nisbett, R. E., & Su, Y. (2001). Culture, change, and prediction. *Psychological Science, 12*(6), 450-456.

Kühnen, U., Hannover, B., Roeder, U., Shah, A. A., Schubert, B., Upmeyer, A., & Zakaria, S. (2001). Cross-Cultural Variations in Identifying Embedded Figures: Comparisons from the United States, Germany, Russia, and Malaysia. *Journal of Cross-Cultural Psychology, 32*(3), 366-372. doi: 10.1177/0022022101032003007

Kashima, Y., Yamaguchi, S., Kim, U., Choi, S.-C., Gelfand, M. J., & Yuki, M. (1995). Culture, gender, and self: A perspective from individualism-collectivism research. *Journal of Personality and Social Psychology, 69*, 925-937.

Kitayama, S. (2002). Culture and basic psychological processes--Toward a system view of culture: Comment on Oyserman et al. (2002). *Psychological Bulletin, 128*(1), 89-96.

Kitayama, S., Duffy, S., Kawamura, T., & Larsen, J. T. (2003). Perceiving an object and its context in different cultures: A cultural look at New Look. *Psychological Science, 14*(3), 201-206.

Kitayama, S., Duffy, S., & Uchida, Y. (2007). Self as cultural mode of being. In S. Kitayama & D. Cohen (Eds.), *Handbook of cultural psychology* (pp. 136-174). New York: Guilford Press.

Kitayama, S., & Ishii, K. (2002). Word and voice: Spontaneous attention to emotional utterances in two languages. *Cognition & Emotion, 16*(1), 29-59.

Kitayama, S., Ishii, K., Imada, T., Takemura, K., & Ramaswamy, J. (2006). Voluntary Settlement and the Spirit of Independence: Evidence from Japan's 'Northern Frontier.'. *Journal of Personality and Social Psychology, 91*(3), 369-384.

Kitayama, S., Mesquita, B., & Karasawa, M. (2006). Cultural Affordances and Emotional Experience: Socially Engaging and Disengaging Emotions in Japan and the United States. *Journal of Personality and Social Psychology, 91*(5), 890-903.

Kitayama, S., Karasawa, M., Grossmann, I., Na, J., Varnum, M. E. W., & Nisbett, R.E. (2019). East-West Differences in Cognitive Style and Social Orientation: Are They Real? Retrieved from psyarxiv.com/c57ep

Kitayama, S., Park, H., Servincer, A. T., Karasawa, M., & Uskul, A. K. (2009). A Cultural Task Analysis of Implicit Independence: Comparing North America, West Europe, and East Asia. *Journal of Personality and Social Psychology, 97*(2), 236-255.

Knight, N., & Nisbett, R. E. (2007). Culture, class and cognition: Evidence from Italy. *Journal of Cognition and Culture, 7*(3), 283-291.

Kraus, M. W., Piff, P. K., Mendoza-Denton, R., Rheinschmidt, M. L., & Keltner, D. (2012). Social class, solipsism, and contextualism: How the rich are different from the poor. *Psychological Review, 119*(3), 546-572. doi: 10.1037/a0028756

Kuhn, M. H., & McPartland, T. S. (1954). An empirical investigation of self-attitudes. *American Sociological Review, 19*, 68-76.

Lubke, G. H., & Muthén, B. O. (2007). Performance of Factor Mixture Models as a Function of Model Size , Covariate Effects , and Class-Specific Parameters. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(1), 26-47. doi: OI: 10.1207/s15328007sem1401_2

Malinowski, B. (1992). *Argonauts of the western Pacific*. London: Routledge.

Markus, H. R., & Conner, A. L. (2013). *Clash! 8 Cultural conflicts that makes us who we are*. New York: Hudson Street Press.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review, 98*, 224-253.

Markus, H. R., & Kitayama, S. (2010). Cultures and selves: A cycle of mutual constitution. *Perspectives on Psychological Science, 5*(4), 420-430.

Marquez, R. C., & Ellwanger, J. (2014). Independent and Interdependent Self-Construals do Not Predict Analytic or Holistic Reasoning. *Psychological Reports, 115*(1), 326-338. doi: 10.2466/17.07.PR0.115c16z8

Masuda, T., & Nisbett, R. E. (2006). Culture and Change Blindness. *Cognitive Science, 30*(2), 381-399.

McCrae, R. R., & Costa, P. T. (1999). A Five-Factor theory of personality *Handbook of personality: Theory and research, 2nd ed.* (pp. 139-153). New York, NY, US: Guilford Press.

Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review, 102*(2), 246-268.

Muthén, L. K., & Muthén, B. O. (2012). *Mplus statistical modeling software: Release 7.1*. Los Angeles, CA: Muthén & Muthén.

Na, J., Grossmann, I., Varnum, M. E. W., Kitayama, S., Gonzalez, R., & Nisbett, R. E. (2010). Cultural differences are not always reducible to individual differences. *Proceedings of the National Academy of Sciences of the United States of America, 107*(14), 6192-6197.

Nisbett, R. E. (2007). A psychological perspective: Cultural psychology--Past, present, and future. In S. Kitayama & D. Cohen (Eds.), *Handbook of cultural psychology.* (pp. 837-844). New York, NY US: Guilford Press.

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review, 108*(2), 291-310.

Norenzayan, A., Choi, I., & Peng, K. (2007). Perception and cognition. In S. Kitayama & D. Cohen (Eds.), *Handbook of cultural psychology.* (pp. 569-594). New York, NY US: Guilford Press.

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the Number of Classes in Latent Class Analysis and Growth Mixture Modeling: A Monte Carlo Simulation Study. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(4), 535-569. doi: 10.1080/10705510701575396

Peng, K., & Nisbett, R. E. (1999). Culture, dialectics, and reasoning about contradiction. *American Psychologist, 54*(9), 741-754.

Ram, N., Coccia, M., Conroy, D., Lorek, A., Orland, B., Pincus, A., ... & Gerstorf, D. (2013). Behavioral landscapes and change in behavioral landscapes: A multiple time-scale density distribution approach. *Research in Human Development*, *10*(1), 88-110.

Rhee, E., Uleman, J. S., Lee, H. K., & Roman, R. J. (1995). Spontaneous self-descriptions and ethnic identities in individualistic and collectivistic cultures. *Journal of Personality and Social Psychology, 69*(1), 142-152.

Robinson, W. (1950). Ecological Correlations and the Behavior of Individuals. *American Sociological Review, 15*(3), 351-357.

San Martin, A., Schug, J., & Maddux, W. W. (2019). Relational mobility and cultural differences in analytic and holistic thinking. *Journal of Personality and Social Psychology, 116*(4), 495-518. doi: http://dx.doi.org/10.1037/pspa0000142

Shoda, Y., Mischel, W., & Wright, J. C. (1994). Intraindividual stability in the organization and patterning of behavior: Incorporating psychological situations into the idiographic

analysis of personality. *Journal of Personality and Social Psychology, 67*(4), 674-687. doi: http://dx.doi.org/10.1037/0022-3514.67.4.674

Shweder, R. A. (1991). *Thinking through cultures: Expeditions in cultural psychology*. Cambridge, MA: Harvard University Press.

Singelis, T. M. (1994). The measurement of independent and interdependent self-construals. *Personality and Social Psychology Bulletin, 20*(5), 580-591.

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. Englewood Cliffs, NJ: Prentice-Hall.

Smith, P. B., & Bond, M. H. (1998). *Social Psychology Across Cultures* (2nd ed.). Boston: Allyn and Bacon.

Stephens, N. M., Fryberg, S. A., & Markus, H. R. (2011). When choice does not equal freedom: A sociocultural analysis of agency in working-class American contexts. *Social Psychological and Personality Science, 2*(1), 33-41. doi: 10.1177/1948550610378757

Stephens, N. M., Markus, H. R., & Phillips, L. T. (2014). Social class culture cycles: How three gateway contexts shape selves and fuel inequality. *Annual Review of Psychology, 65*, 611-634. doi: 10.1146/annurev-psych-010213-115143

Stevens, J. P. (2012). *Applied Multivariate Statistics for the Social Sciences* (5th ed.): Routledge.

Tönnies, F. (1887/1988). *Community and Society*. New Brunswick: Oxford Transaction Books.

Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological Review, 96*, 269-289.

Triandis, H. C. (1996). The psychological measurement of cultural syndromes. *American Psychologist, 51*(4), 407-415.

Tsai, J. L. (2007). Ideal affect: Cultural causes and behavioral consequences. *Perspectives on Psychological Science, 2*(3), 242-259.

Van den Akker, A. L., Deković, M., Asscher, J. J., Shiner, R. L., & Prinzie, P. (2013). Personality types in childhood: Relations to latent trajectory classes of problem behavior and overreactive parenting across the transition into adolescence. *Journal of Personality and Social Psychology, 104*(4), 750-764. doi: http://dx.doi.org/10.1037/a0031184

Varnum, M. E. W., Grossmann, I., Katunar, D., Kitayama, S., & Nisbett, R. E. (2008). Holism in a European cultural context: Differences in cognitive style between Central and East Europeans and Westerners. *Journal of Cognition and Culture, 8*(3), 321-333.

Varnum, M. E. W., Grossmann, I., Kitayama, S., & Nisbett, R. E. (2010). The Origin of Cultural Differences in Cognition: Evidence for the Social Orientation Hypothesis. *Current Directions in Psychological Science, 19*(1), 9-13.

Varnum, M. E. W., Na, J., Murata, A., & Kitayama, S. (2012). Social class differences in N400 indicate differences in spontaneous trait inference. *Journal of Experimental Psychology: General, 141*(3), 518-526. doi: 10.1037/a0026104

Witkin, H. A., & Goodenough, D. R. (1981). Cognitive styles: essence and origins. Field dependence and field independence. *Psychological Issues*(51), 1-141.

Wundt, W. (1888). Uber Ziele und Wege der Volkerpsychologie. *Philosphische Studien, 4*.

Table 1. Demographic information

	N	*M* Age (*SD*)	% of Female	% of College Education
Study 1: JPN	433	46.60 (13.84)	49.7%	75.8%
Study 1: US	233	48.23 (15.34)	51.1%	87.6%
Study 2: Time 1	485	36.80 (11.43)	58.1%	91.7%
Study 2: Time 2	235	37.99 (11.45)	60.4%	91.9%

Table 2. The number of participants for each measure in Japan and the US.

	Japan	US		Japan	US
IOS	172	187	Inclusion	188	221
Engaged vs. Disengaged Emotions	429	227	Proverb	188	231
Predictor of Happiness	424	227	Change	178	209
Self-Inflation	173	185	Triad	172	189
Vocal Stroop	161	153	Attribution	433	188
Self-Construal	431	189	Outside in	186	228
All	154	141	FLT	178	210
			Change Blindness	155	204
			Narrative	173	199
			Underwater	177	203
			TST	167	222
			All	138	151

Table 3. Means, SDs, and reliabilities of measures of social orientation and cognitive style.

		Japan			US			JPN vs. US		
		M(*SD*)	α (*n*) Ind/Ana	α (*n*) Int/Hol	*M*(*SD*)	α (*n*) Ind/Ana	α (*n*) Int/Hol	*t*(df)	*p*	*d*
Social Orientation	IOS	5.65(1.31)			5.07(1.52)			3.81(357)	<.001	0.40
	Intensity of Engaged Emotions	0.32(0.72)	.78(10)	.74(10)	-0.43(0.62)	.78(10)	.73(10)	13.26(654)	<.001	1.09
	Predictor of Happiness	0.50(0.48)			0.23(0.60)			6.15(649)	<.001	0.51
	Self-inflation	-0.14(0.30)			-0.25(0.40)			3.07(356)	.002	0.33
	Vocal Stroop (log)	6.28(0.23)	.84(14)		6.04(0.67)	.94(14)		4.22(312)	<.001	0.47
	Self-Construal	-0.11(0.54)	.65(12)	.69(12)	-0.43(0.88)	.52(12)	.62(12)	5.39(618)	<.001	0.43
Cognitive Style	Inclusive reasoning	66.52(18.42)	.96 (97)		47.78(18.27)	.96(97)		10.30(407)	<.001	1.02
	Proverb	0.50(0.70)	.87 (8)	.88 (8)	0.32(0.80)	.86 (8)	.85 (8)	2.41(417)	.016	0.24
	Change	46.37(12.39)	.70 (8)		32.1(10.61)	.73(8)		12.20(385)	.001	1.24
	Triad (log)	-0.99(0.80)	.88 (14)		-1.11(0.72)	.78(14)		1.58(359)	.115	0.18
	Attribution	0.11(1.10)	.67 (8)	.65 (8)	-0.17(1.26)	.58 (8)	.56 (8)	2.78(619)	.006	0.24
	Outside in (log)	1.17(0.74)	.52 (2)		0.67(0.73)	.62(2)		6.91(412)	<.001	0.70
	FLT	6.65(7.66)	.64 (6)	.48 (4)	6.83(6.74)	.62 (6)	.52 (6)	-0.24(386)	.807	-0.02
	Change Blindness	0.35(0.84)	.57 (4)	.51(4)	0.05(0.72)	.63 (4)	.63 (4)	3.54(357)	<.001	0.38
	Underwater Animation (log)	3.92(0.49)	.93 (8)	.87 (8)	4.3(0.40)	.88 (8)	.87 (8)	8.30(378)	<.001	0.86
	Narrative	-58.66(33.83)	.78 (4)	.60 (4)	-68.25(37.76)	.64 (2)	.24 (2)	2.56(370)	.011	0.27

TST	0.89(0.13)	.64 (20)	0.69(0.31)	.86 (20)	7.78(387)	<.001	0.79

Table 4. Pearson's correlations among measures of social orientation for Japanese (below the diagonal) and Americans (above the diagonal).

	1.	2.	3.	4.	5.	6.
1. IOS	--	.070	-.015	.027	.335**	-.022
2. Engaged vs. Disengaged Emotions	.055	--	.110	-.108	-.016	.169*
3. Predictor of Happiness	.150	.233**	--	.137	-.094	-.023
4. Self-Inflation	-.122	-.062	-.141	--	-.029	.022
5. Vocal Stroop	.119	-.001	.131	-.065	--	.180*
6. Self-construal	.148	.067	.045	.015	.048	--

* p <.05 & ** p < .001

Table 5. Pearson's correlations among measures of cognitive style for Japanese (below the diagonal) and Americans (above the diagonal).

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Inclusion	--	-.022	-.019	.073	-.049	.106	-.054	.114	.082	-.052	-.002
2, Proverb	.053	--	.091	.094	.017	.073	-.035	-.004	-.076	-.068	-.035
3. Change	.151*	-.034	--	.142	.056	.023	.089	-.090	.193**	.122	-.084
4. Triad	-.135	-.030	.041	--	.090	-.028	.095	-.017	.065	.209**	-.111
5. Attribution	-.049	-.051	.190*	-.045	--	-.038	.216**	-.115	.129	-.040	-.008
6. Outside in	-.003	-.086	.060	-.127	.037	--	-.017	-.027	.114	-.116	-.023

7. FLT	.012	-.016	.193*	-.015	.116	-.006	--	.001	.133	.212**	-.076
8. Change Blindness	-.040	-.014	-.021	-.052	.117	.064	.115	--	-.021	-.108	-.074
9. Narrative	-.063	-.065	-.004	-.030	.004	-.020	-.029	.091	--	.139	-.058
10. Underwater	-.067	-.065	.185*	.011	.164*	.095	.158*	.042	.325**	--	.032
11. TST	-.044	-.030	-.055	.046	.124	-.049	-.015	.166*	.109	.141	--

* p <.05 & ** p < .001

Table 6. Factor loadings and the percent of variance explained by the first factor.

Social Orientation				Cognitive Style			
Measures	JPN	US	ALL	Measures	JPN	US	ALL
IOS	.150	.030	.308	Inclusion	-.035	.085	.148
Intensity of Engaged Emotions	.124	.648	.088	Proverb	-.004	-.082	.053
Predictor of Happiness	.089	.053	.025	Change	.483	.229	.341
Self-Inflation	.013	-.767	.000	Triad	-.042	.196	.116
Vocal Stroop	.040	.222	.999	Attribution	.210	.073	.116
Self-Construal	.999	.092	.195	Outside in	.016	.261	.139
				FLT	.373	.224	.128
				Change Blindness	.040	-.113	.010
				Underwater	.666	.799	260
				Narrative	.829	.672	.999

				TST	.002	-.067	.189
% of Variance	17.44	17.85	19.01	% of Variance	14.11	12.14	11.87

Table 7. Task-specific internal consistency (αs) at Time 1 and Time 2

	IOSS	Self-construal Scale	Engaged vs. Disengaged Emotions	Outside in	Change	Inclusion	TST
Time 1	.75 (3)	$.83\ (12)_{Ind}$ $.83\ (12)_{Inter}$	$.82\ (10)_{Ind}$ $.69\ (10)_{Inter}$	.80 (4)	.78 (8)	.92 (6)	.66 (10)
Time 2	.72 (3)	$.84\ (12)_{Ind}$ $.86\ (12)_{Inter}$	$.85\ (10)_{Ind}$ $.81\ (10)_{Inter}$	.71 (4)	.67 (8)	.90 (6)	.72 (10)

Note. Number of item per task is in parentheses. Predictor of Happiness task is not included, because the calculation provides one estimate per time point.

Table 8. Pearson's correlation of measures of social orientation at Time 1 (below diagonal) and Time 2 (above diagonal)

	IOSS	Self-construal	Engaged vs. Disengaged Emotions	Predictor of Happiness	Time 2 *M* (*SD*)
IOSS	**.697*****	-.084	.076	.046	4.61 (1.61)
Self-construal	-.026	**.913****	-.233**	-.071	0.54 (1.50)

Engaged vs. Disengaged	.048	-.182**	**.486****	.112	-0.18 (0.91)
Emotions Predictor of Happiness	-.095*	-.046	.087	**.161****	0.38 (1.01)
Time 1 *M* (*SD*)	4.55 (1.70)	0.55 (1.38)	-0.19 (0.90)	0.43 (0.91)	

Note. Cross-temporal correlations of each task (highlighted in bold) are presented on the diagonal. A both time points, a few participants reported not experiencing events necessary for calculation of the emotion-related measures or reported no variability in reports of happiness, leading to smaller samples for these tasks (Time 1 $n = 462$ / Time 2 $n = 229$). * $p < .05$ & ** $p < .001$.

Table 9. Pearson's correlations among measures of cognitive style at Time 1 (below diagonal) & Time 2 (above diagonal)

	Outside in	Change	Inclusion	TST	Time 2 *M* (*SD*)
Outside in	**.704****	.018	-.112	-.107	2.88 (2.02)
Change	.127**	**.526****	-.009	-.010	28.25 (10.06)
Inclusion	.019	.023	**.619****	-.001	47.32 (17.91)
TST	.003	-.024	.092*	**.471****	0.20 (0.21)
Time 1 *M* (*SD*)	3.16 (2.35)	28.16 (12.08)	45.83 (17.77)	0.22(0.21)	

Note. Cross-temporal correlations of each task (highlighted in bold) are presented on the diagonal. A both time points, a few participants reported not experiencing events necessary for calculation of the Outside-in measure, leading to smaller samples for this task (Time 1 n = 465 / Time 2 n = 231). * p <.05 & ** p < .001.

Table 10. Latent Class Analyses at Time 1 & Time 2

		Social Orientation			Cognitive Style		
	Number of Classes	2	3	4	2	3	4
Time 1	AIC	2562.46	2558.16	2548.34	2570.95	2552.19	2541.16
	BIC	2607.16	2620.05	2627.42	2615.64	2614.08	2620.24
	SSA-BIC	2565.96	2563	2554.52	2574.44	2557.03	2547.34
	Entropy	.76	.83	.83	.91	.81	.85
	LMRT (p)	.001	.34	.14	.004	.11	.44
	BLRT (p)	.000	.09	.000	.000	.000	.000
Time 2	AIC	2395.94	2381.62	2367.72	2572.73	2541.62	2536.817
	BIC	2440.64	2443.51	2446.80	2617.42	2603.50	2615.893
	SSA-BIC	2399.43	2386.46	2373.90	2576.22	2546.45	2542.997
	Entropy	.76	.83	.85	.85	.84	.87
	LMRT (p)	.002	.23	.25	.04	.003	.51

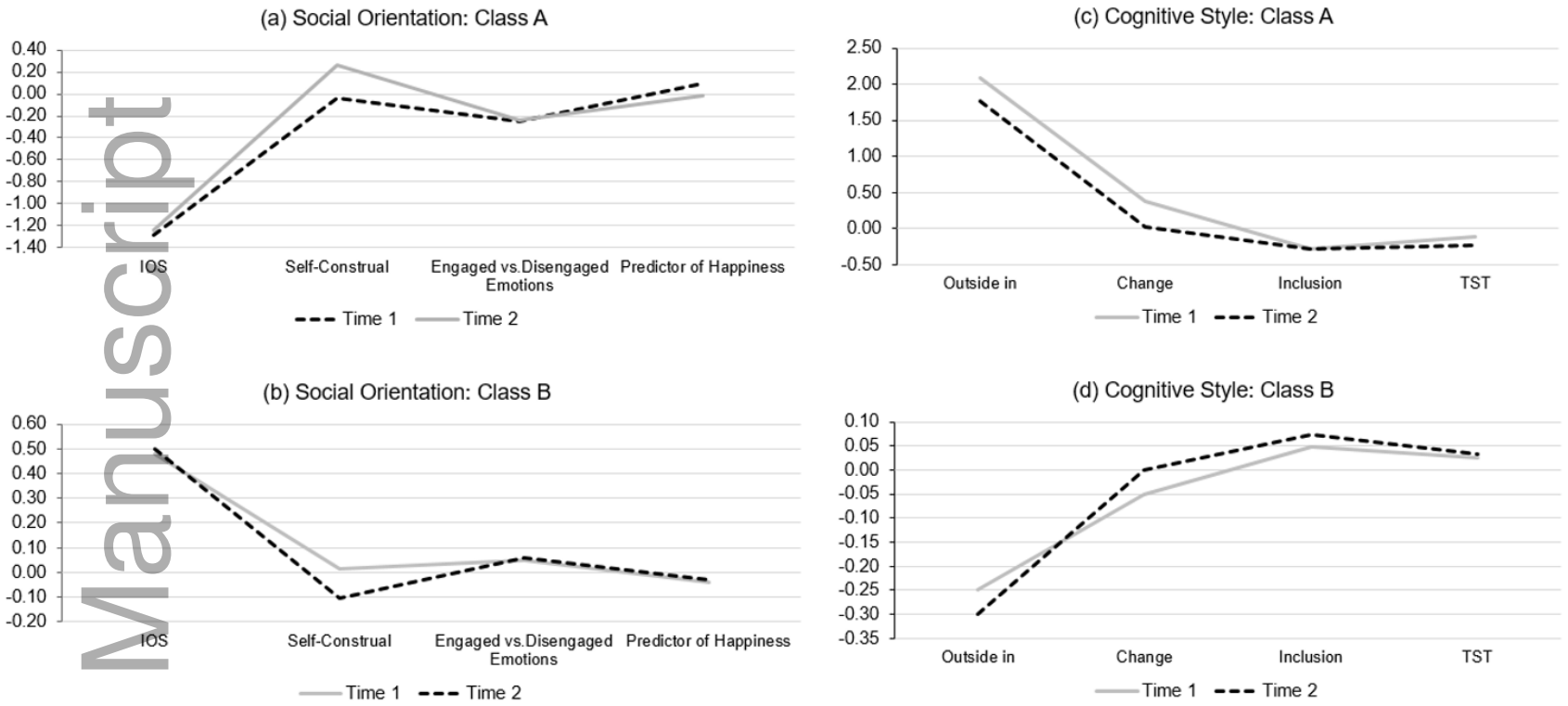

Figure 1. Estimated mean levels for measures of social orientation and cognitive style for two classes at Tim 1 and Time 2. The Y axis reflects standardized scores.