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Cultural Differences in Spontaneous Trait and Situation Inferences

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Abstract

Previous findings indicated that when people observe someone's behavior, they spontaneously infer the traits and situations that cause the target person's behavior. These inference processes are called spontaneous trait inferences (STIs) and spontaneous situation inferences (SSIs). While both patterns of inferences have been observed, no research has examined the extent to which people from different cultural backgrounds produce these inferences when information affords both trait and situation inferences. Based on the theoretical frameworks of social orientations and thinking styles, we hypothesized that European Canadians would be more likely to produce STIs than SSIs because of the individualistic/independent social orientation and the analytic thinking style dominant in North America, whereas Japanese would produce both STIs and SSIs equally because of the collectivistic/interdependent social orientation and the holistic thinking style dominant in East Asia. Employing the savings-in-relearning paradigm, we presented information that affords both STIs and SSIs and examined cultural differences in the extent of both inferences. The results supported our hypotheses. The relationships between culturally dominant styles of thought and the inference processes in impression formation are discussed.

Keywords

spontaneous trait, situation inferences, culture, savings-in-relearning, social orientations, thinking styles, impression formation

When you first meet a potential partner on a blind date, you naturally pay attention to how the person acts to assess how likable he or she is. If the person spills water at the restaurant, for example, you may infer from the behavior that he or she has the personality trait of clumsiness. Or you may think the behavior is a result of the stressful situation of being on a first date. Depending on how you view the behaviors of others, you make inferences about the person's traits and/or the situations the person is in, and these inferences further influence your impressions of the person. These social inferences often occur without our intentions, awareness, or efforts—that is, spontaneously. This phenomenon is called spontaneous inference (see Uleman, Saribay, & Gonzalez, 2008, for a review).

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While the occurrences of spontaneous inferences have been robust among Western populations, recent findings in cultural psychology have reported cultural variations in cognition, suggesting that the magnitude and types of spontaneous inference could differ across cultures. Based on the theoretical frameworks of individualistic/independent versus collective/interdependent social orientations (Kitayama, Duffy, & Uchida, 2007; Markus & Kitayama, 1991, 2010; Triandis, 1989, 1990; Varnum, Grossmann, Kitayama, & Nisbett, 2010) and analytic versus holistic thinking styles (Nisbett, 2003; Nisbett & Masuda, 2003; Nisbett & Miyamoto, 2005; Nisbett, Peng, Choi, & Norenzayan, 2001), we investigated to what extent trait and situation information are spontaneously inferred from behaviors among European Canadians and among Japanese. Our aim was to scrutinize how differences in worldviews produce differences in the allocation of cognitive resources to spontaneous trait versus situation inferences.

Spontaneous Trait Inferences (STIs) and Spontaneous Situation Inferences (SSIs)

Over the past three decades, social psychologists have shown that when people observe someone's behavior, they form an impression of the target person not only explicitly (e.g., being aware of the goal of forming the impression, consciously processing related information about the person, and deliberately encoding the person's behavior) but also implicitly (i.e., spontaneously drawing inferences about the person's internal attributes, without being aware of doing so). This process has been investigated under the rubric of *spontaneous trait inferences* (Carlston & Skowronski, 1994; Uleman, Blader, & Todorov, 2005; Uleman, Newman, & Moskowitz, 1996; Uleman, Rim, Saribay, & Kressel, 2012; Winter & Uleman, 1984). Traits were not only spontaneously activated by the target person's specific behaviors (Newman & Uleman, 1993) but were also linked in participants' memory to the representation of the target person (Todorov & Uleman, 2002, 2003).

While the well-established STI process has been examined in relation to other social psychological phenomena such as causal attributions (Kressel & Uleman, 2015; Uleman, 2015) and the correspondence bias (e.g., Gilbert & Malone, 1995), other research has examined whether people make spontaneous inferences not only about properties of other people but also about properties of the situation a person is in (e.g., Ham & Vonk, 2003; Lupfer, Clark, & Hutcherson, 1990; Todd, Molden, Ham, & Vonk, 2011). This possibility has been investigated under the name of *spontaneous situation inference*.

Do STIs and SSIs co-occur? For example, upon hearing "she jumped over the fence with ease," do people spontaneously infer the target person's trait (e.g., "she is athletic") as well as a situation that led her to so behave (e.g., "the fence is low")? Various researchers have examined this possibility (see Uleman, 1999, for a review), and recent findings give credence to this idea (Ham & Vonk, 2003; Todd et al., 2011). For example, Ham and Vonk (2003, Study 2) instructed participants to form an impression of either the target agent or the situation before being presented with behavioral descriptions. The results indicated that, independent of the instruction of forming an impression of the agent or of the situation, which leads to intentional inferences, participants spontaneously inferred the properties of the noninstructed object (situation or agent). Thus, SSIs co-occurred with intentional trait inferences, and STIs co-occurred with intentional situation inferences. Ham and Vonk's Study 1 showed STI and SSI co-occurring in the same participants.

The findings of Todd and colleagues (2011) lend support to the above findings, demonstrating that when participants deliberately engaged in forming an impression, their inference became more consistent with the goal of the task. If they were asked to form an impression of the agent, they focused more on the trait information, whereas if they were asked to form an impression of

the situation, they focused more on the situational information. However, when the goal of the task was not clearly indicated, participants showed both STIs and SSIs. These findings converge to demonstrate that both types of spontaneous inferences co-occur when people are presented with a target person's behavior in a given situation.

Culture and Spontaneous Inferences

While social cognitive processes have been extensively investigated in social psychology, recent findings in cultural psychology suggest that there are substantial cultural variations in them. Notably, two major theoretical frameworks converge to advocate systematic cultural variations in social cognition between East Asian cultures (e.g., Chinese, Korean, and Japanese cultures) and Western cultures (e.g., North American and European cultures).

First, the social orientation theory maintains that the social orientations in Western cultures are independent, viewing the self as bounded and separate from social others, consisting of internal traits, whereas the social orientations in East Asian cultures are interdependent, viewing the self as interconnected and encompassing social relationships (Markus & Kitayama, 1991, 2010; Varnum et al., 2010). Similarly, Triandis (1989, 1990) maintained that people in Western cultures hold individualistic values, emphasizing individuals' personal goals, whereas people in East Asian cultures hold collectivistic values, emphasizing group goals. Empirical evidence suggests that people with high individualistic/independent orientations identify themselves based on their internal attributes, which are thought to be stable across situations, whereas people with high collectivistic/interdependent social orientations describe themselves in terms of their social roles and obligations to others, while being sensitive to contextual factors (e.g., Cousins, 1989; Kanagawa, Cross, & Markus, 2001).

In line with these empirical findings, STIs have also been examined in cross-cultural contexts (Lee, Shimizu, & Uleman, 2015; Na & Kitayama, 2011; Newman, 1993; Shimizu, 2012; Shimizu, Lee, & Uleman, 2017; Zárate, Uleman, & Voils, 2001). For example, Newman (1993) found STIs more frequently among Americans high in ideocentrism, an individual-level measure of individualism. Similarly, Zárate et al. (2001) found that STIs were more frequent among Anglos (individualists) than Chicanos (collectivists) in Texas. Na and Kitayama (2011) compared European Americans with Asian Americans on spontaneous trait activation and binding to the actor, using both behavioral and neurological methods. They demonstrated that individuals' performance on a lexical decision task showed that only European Americans spontaneously activated trait concepts. Furthermore, differences in event-related potential (ERP) responses pointed to cultural differences in trait binding. European Americans' ERPs showed detection of incongruities between the traits they spontaneously inferred about targets and subsequent antonyms describing the targets while Asian Americans did not. Similarly, Shimizu (2012) and Lee et al. (2015) demonstrated that STI is robust for both Japanese and Americans but occurs less frequently among Japanese than Americans. In sum, these findings converge to demonstrate that the magnitude of STI is generally stronger for North Americans than for East Asians.

Another framework in cultural psychology advocates systematic cultural variations in thinking styles which influence social cognition (Nisbett, 2003; Nisbett & Masuda, 2003; Nisbett & Miyamoto, 2005; Nisbett et al., 2001). Westerners dominantly hold an *analytic thinking style*, which relies on the processes of decontextualizing the target object from the context to explain the object's behavior (Nisbett et al., 2001). In contrast, East Asians dominantly hold a *holistic thinking style*, which involves attention to relationships between a target object and the context, and explains the object's behavior based on such relationships.

Empirical studies suggest that while Westerners devote more attention to focal objects than to the background, East Asians allocate their attention equally to both the focal objects and the background (e.g., Masuda & Nisbett, 2001, 2006; Masuda, Wang, Ishii, & Ito, 2012; Senzaki,

Masuda, & Ishii, 2014; Senzaki, Masuda, Takada, & Okada, 2016). Recent neuroscientific findings also suggest that East Asians are more likely than their Western counterparts to be sensitive to incongruities between foreground and background information (Masuda, Russell, Chen, Hioki, & Caplan, 2014; Russell, Masuda, Hioki, & Singhal, 2015).

These culturally distinct systems of thought have also been demonstrated in the extent to which people *intentionally* infer traits from social behavior (e.g., Choi & Nisbett, 1998; Choi, Nisbett, & Norenzayan, 1999; Lieberman, Jarcho, & Obayashi, 2005; Masuda & Kitayama, 2004; Miyamoto & Kitayama, 2002; Norenzayan, Choi, & Nisbett, 2002). In these studies, both Westerners and East Asians inferred a correspondence between the target person's behavior and his or her personal characteristics. However, East Asians were more likely than their Western counterparts to be sensitive to the magnitude of the contextual factors. Thus, the East Asians' behavior–trait and/or behavior–attitude correspondence was attenuated, especially when the magnitude of the contextual constraints was apparently large.

If there are substantial cultural variations in thinking styles and associated social cognition, it is reasonable to assume that the magnitude and types of spontaneous inference should differ between North Americans and East Asians. Westerners, as holders of an *analytic thinking style*, would allocate their attention to a person who enacts a trait-implying behavior more than to the situation which induces their behavior. Therefore, they are higher in STI than in SSI. In contrast, East Asians, as holders of a *holistic thinking style*, would allocate their attention both to a person's trait-implying behavior and to the situation which induces their behavior. Therefore, their level of STI does not differ significantly from that of SSI.

Hypotheses

Considering the cultural differences in social orientations, thinking styles, and associated social cognitive processes, it is important to examine whether there are cultural variations in the magnitude of STIs and SSIs when the experimental manipulation leads participants to simultaneously make both types of inferences (Ham & Vonk, 2003; Todd et al., 2011). However, no research has investigated the magnitude of STIs and SSIs simultaneously in a cross-cultural context. In this article, we investigate whether STIs and SSIs occur for both North Americans and East Asians, and to what extent spontaneous trait and situation inferences occur for participants in the respective cultures.

Based on previous findings, we hypothesized that both spontaneous trait and situation inferences would co-occur among European Canadians as well as Japanese. However, based on cross-cultural findings regarding differences in thinking styles (e.g., Nisbett et al., 2001), and findings showing more STIs among North Americans compared with East Asians (Lee et al., 2015; Na & Kitayama, 2011; Shimizu, 2012; Shimizu et al., 2017), we expected that in addition to the culturally universal patterns of spontaneous inferences there would be systematic cultural variations in the magnitude of the two types of spontaneous inferences. More specifically, based on these existing cultural theoretical frameworks (i.e., individualistic/independent vs. collectivistic/interdependent social orientations, and analytic vs. holistic thinking styles), we investigated the extent to which trait and situation inferences occur spontaneously from situated behaviors among European Canadians and among Japanese. We expected that European Canadians, who are independent (individualistic) and analytic, would tend to focus on the internal attributes of a person (i.e., traits) by decontextualizing the person from the context. Therefore, European Canadians would be more likely to make STIs than SSIs. On the contrary, Japanese, who are interdependent (collectivistic) and holistic, would tend to focus on the relations between persons and contexts by incorporating the person embedded in the context. Therefore, Japanese would make spontaneous trait and situation inferences equally.

A variety of experimental paradigms for measuring the occurrence of spontaneous inferences is available (for a review, see Uleman et al., 2012). We applied a savings-in-relearning paradigm

(Carlston & Skowronski, 1994; Carlston, Skowronski, & Sparks, 1995), which taps implicit memory through an explicit memory task. This paradigm has the important advantage of detecting not only the activation of concepts (i.e., trait or situation) from a prior exposure but also the implicit association between the inferred concepts and the target persons in memory. It also includes cognitive processes that differ by culture (Masuda et al., 2014). In the savings-in-relearning paradigm, participants are first exposed to images of faces paired with behavioral descriptions that imply traits and situations. They are then asked to memorize pairs of faces and words without any reference to their prior experience. Paired-associates learning of the same words they may have previously inferred from the behavioral descriptions will then be easier than learning novel words because the first exposure produced initial learning, resulting in a *savings effect* through relearning in the second memorization. Thus, the difference in participants' subsequent paired-associates recall of the inferred words and novel words provides the estimate of spontaneous trait and situation inferences, respectively.

Method

Participants

We recruited 132 European Canadian undergraduate students (M_{age} = 19.17, range = 17-24 years) from the subject pool at the University of Alberta in Canada, and 124 Japanese undergraduates (M_{age} = 19.80, range = 18-25 years) from an introductory psychology class at Saitama University in Japan. The Canadian participants received course credit for their participation and the Japanese participants received a small honorarium for their participation. Instructions in all tasks were presented in participants' native languages (i.e., English for the European Canadians and Japanese for the Japanese). The experiment materials were originally created in English, translated into Japanese, and back-translated into English to verify the equivalence of the contents (Brislin, 1970).

Stimuli

Behavioral descriptions and photographs. To select equivalent stimuli for the cultures, we pretested 73 pairs of behavioral descriptions and photographs with European Americans at New York University and Japanese participants at Saitama University. For the pretest, we recruited 37 European American participants (M_{age} = 19.46, range = 18-22 years) and 20 Japanese participants (M_{age} = 18.67, range = 18-21 years). The behavioral descriptions were adapted from those used by Ham and Vonk (2003) and Uleman (2017). We presented each behavioral description, with a photograph of a person and the situation the person was thinking about, and participants were asked to write down two possible inferences about the dispositional traits of the person and two possible inferences about the situation. The pretest participants were also asked to rate the desirability of the person's behavior according to social norms, using a 9-point scale. Because people in Japan are ethnically less diverse than North Americans (e.g., Kumagai, 1996) and have fewer cross-racial experiences, previous studies of spontaneous inference used ethnically diverse stimuli for North Americans and ethnically homogeneous stimuli (Asians) for Japanese (e.g., Lee et al., 2015; Shimizu et al., 2017). In this study, we applied the same design as used in these previous works: European Americans viewed faces of various races and Japanese participants viewed only Asian faces. The same 40 situations were used across cultures.

From the results of a pretest, we selected the 40 behavioral descriptions that had the highest consensus for both the trait and situation inferences. The consensus rate among the European American pretest participants was 65% for the 40 implied trait words and 42% for the 40 implied situation words. The consensus rate among the Japanese participants was 70% for the 40 implied trait words and 63% for the 40 implied situation words. We then created two sets of stimuli (sets

A and B) for the exposure task. Set A contained half of the 40 pretested behavioral descriptions. Set B contained the other half of the behavioral descriptions. Set A and Set B also contained 20 control descriptions; the control descriptions were the same for both sets. The 20 control descriptions were adapted from a previous study (Uleman, Hon, Roman, & Moskowitz, 1996), which found low consensus rates for their trait implications. In addition, based on the findings of Higgins and Bargh (1987), which indicated that the desirability of the trait words influences participants' evaluations of the person, we matched the social desirability ratings between the two cultures when we selected the behavioral descriptions to be used in the study. We used all of these words in the learning task of the experiment (see Table 1 for the behavioral descriptions and the implied trait and situation words).

Procedure

Participants were escorted to a classroom when they arrived at the site, and filled in a consent form before the session. To measure the occurrence of spontaneous trait and situation inferences, we adopted the savings-in-relearning paradigm (Carlston & Skowronski, 1994; Carlston et al., 1995). This implicit memory paradigm allows researchers to detect the association between the person and the trait (i.e., STIs) and the association between the person and the property of a situation (i.e., SSIs) in memory. Thus, the experiment comprised a sequence of five tasks including three main tasks and two filler tasks, and participants engaged in the tasks in the following order: (a) the exposure task, (b) the first filler task (~10 min long), (c) the learning task, (d) the second filler task (~5 min long), and (e) the cued-recall task (see Figure 1).

Exposure task. Participants were randomly assigned to either Set A or Set B stimuli. The stimuli were projected at the front of the classroom. Before beginning, we asked participants to carefully look at each pair of photographs and behavioral descriptions that were going to be shown. The participants were randomly exposed to 40 photograph–behavior pairs: 20 trait- and situation-implying behavioral descriptions (e.g., "She jumped over the fence with ease," implying either a trait—that she is athletic—or a situation—that the fence is low) and 20 control descriptions (e.g., "She couldn't get a chance to greet her new neighbor"). Each behavioral description was displayed beneath a photo with two elements, a person and a situation. Each photograph–behavior pair was presented for 8 s.

Learning task. After a 10-min filler task, participants were asked to memorize 40 pairs of a photograph and a word (a property of either the person or the situation). The 40 face–word pairs were of four types: (a) 10 faces from the trait- and situation-implying descriptions, matched with the implied trait words (trait match trials); (b) 10 faces from the trait- and situation-implying descriptions, matched with the implied situation words (situation match trials); (c) 10 faces from the control descriptions, mismatched with novel trait words (trait mismatch trials); and (d) 10 faces from the control descriptions, mismatched with novel situation words (situation mismatch trials). Each pair was displayed for 5 s. In this task, participants would relearn 10 trait and 10 situation words if they had spontaneously inferred those words in the previous exposure task.

Cued-recall task. After a 5-min filler task, participants were asked to recall words that had been paired with photographs in the learning task. Words were cued with photos from the learning task. We expected that participants would have better word memory for the photographs they had seen in the trait match and situation match trials in the learning task, compared with those in the trait mismatch and situation mismatch trials. To measure the occurrence of STIs, we subtracted the mean number of recalled words in the mismatch trait trials from the mean number of recalled words in the match trait trials. Likewise, to measure the SSIs, we subtracted the mean number of

Table 1. Forty Trait- and Situation-Implying Behavior Sentences and 20 Control Sentences.

Type	Behavioral description	Trait	Property of situation
Set A of stimuli (20 trait- and situation-implying descriptions)	He returned his library book on the way to class.	Responsible	Convenient
	He accidently dropped the fish he had just caught.	Clumsy	Slippery
	She couldn't afford to buy the top cut of beef.	Poor	Expensive
	He laid on his new couch at home for 2 days.	Lazy	Comfortable
	She did not feel like moving the desk.	Lazy	Heavy
	She failed the quiz even though she studied a lot.	Stupid	Difficult
	His hands began trembling when he rose to address the audience in the conference.	Nervous	Crowded
	He bought his sister a warm overcoat.	Caring	Cold
	He tried for half an hour to turn on the computer.	Unskilled	Broken
	She jumped over the fence with ease.	Athletic	Low
	She played the song after hearing it just once.	Talented	Easy
	He did not study at all for the final term exam.	Irresponsible	Easy
	She often chatted with her classmates during the lecture.	Rude	Boring
	She completed the task while wearing a blindfold.	Skilled	Simple
	She complimented the chef on his food.	Nice	Tasty
	She cried a lot while watching the play.	Emotional	Moving
	He studied 8 hours a day for his Philosophy courses.	Studious	Difficult
	He left the cinema grinning from ear to ear.	Happy	Funny
	He shouted at the referee during the game.	Angry	Unfair
	She asked a dozen questions during the lecture about World War II.	Curious	Interesting
Set B of stimuli (20 trait- and situation-implying descriptions)	She could not answer the teacher's questions in her presentation.	Unprepared	Hard
	He wept when the band played Barbara's Song.	Emotional	Touching
	She gave her friend a sweater when he sneezed twice.	Kind	Cold

(continued)

Table 1. (continued)

Type	Behavioral description	Trait	Property of situation
	He thought he was the best pianist in the class.	Overconfident	Unskilled
	He did not give his autograph to everyone waiting in line.	Busy	Long
	She couldn't find her purse when she returned home.	Forgetful	Stolen
	She saved her weekly allowance to go to the concert.	Thrifty	Worthwhile
	He bought the most expensive ring that the store had.	Rich	Proposing
	On his way to class, he walked right past his sobbing friend.	Inconsiderate	Busy
	She picked out the best brownies for herself before the guests arrived.	Greedy	Delicious
	Her hands shook when she gave her speech to the class.	Nervous	Crowded
	He could not lift the garage door.	Weak	Heavy
	He got lost in the hallway of his new school.	Disoriented	Confusing
	He covered his ears when the girl sang.	Rude	Bad
	He skipped his statistics class last Wednesday.	Lazy	Boring
	He beat his previous SAT score by 100 points when he retook it.	Studious	Easy
	She fell while dancing on the freshly polished floor.	Clumsy	Slippery
	She could not stick to her diet for the week.	Weak-willed	Strict
	She could not solve the puzzle.	Stupid	Complex
	He ran a red light while driving over the speed limit.	Reckless	Rushed
Control (20 descriptions)	She turned off the local talk show about a distant toxic waste dump.		
	She couldn't get a chance to greet her new neighbor.		
	He leaned the desk back on two of its feet.		
	She thought they would like her new haircut.		
	She put out the best chocolates before the guests arrived.		
	He enjoyed watching varsity basketball tryouts for 4 years in a row.		
	He didn't win first place in the citywide high school science fair.		

(continued)

Table 1. (continued)

Type	Behavioral description	Trait	Property of situation
	He couldn't hold a full-time job while being a full-time student.		
	It took 15 minutes to find a place for his car in the parking lot.		
	She thought he didn't deserve their award and praise.		
	Everyone started off before checking their seat belts.		
	He drove to the only newsstand, 20 blocks away.		
	She hoped that they knew that their new glasses looked funny.		
	She asked where the stars go shopping.		
	He and his girlfriend were light on their feet during the foxtrot.		
	She returned to where she lost her own wallet with all her money in it.		
	He screamed for the others to help find the phone.		
	After 20 minutes at the shore, he suddenly remembered he hadn't finished his paper.		
	He walked up one flight to take the elevator.		
	She liked movies more than parties.		

recalled words in the mismatch situation trials from the mean number of recalled words in the match situation trials.

Filler tasks. To reduce the participants' ability to recall the descriptions or the cue words from their short-term memory, we included two filler tasks between the main tasks. In the first filler task, two statements were presented on the screen, and participants were asked to judge which of the two statements left them with a stronger impression. The second filler task was an anagram task, in which they were asked to unscramble letters (e.g., TEORFS) to form words (e.g., FOREST). After completing all the tasks, participants filled out a short questionnaire about the procedure, and then were thanked and debriefed.

Results

To examine how culture affects different types of inferences, the STI and SSI scores were submitted to a 2 (Culture: European Canadian vs. Japanese) × 2 (Inference: STI vs. SSI) mixed-design ANOVA, in which culture served as the between-subjects factor and type of inference served as the within-subjects factor.[1] We did not find any main effects of culture or inference: culture, $F < 1$, *ns*; inference, $F(1, 254) = 1.93$, $p = .17$. Most importantly, the two-way interaction

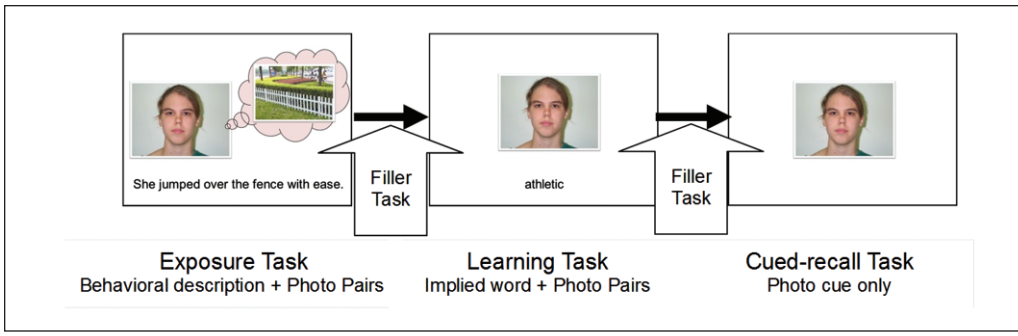

Figure 1. The sequence of tasks in the savings-in-relearning paradigm.

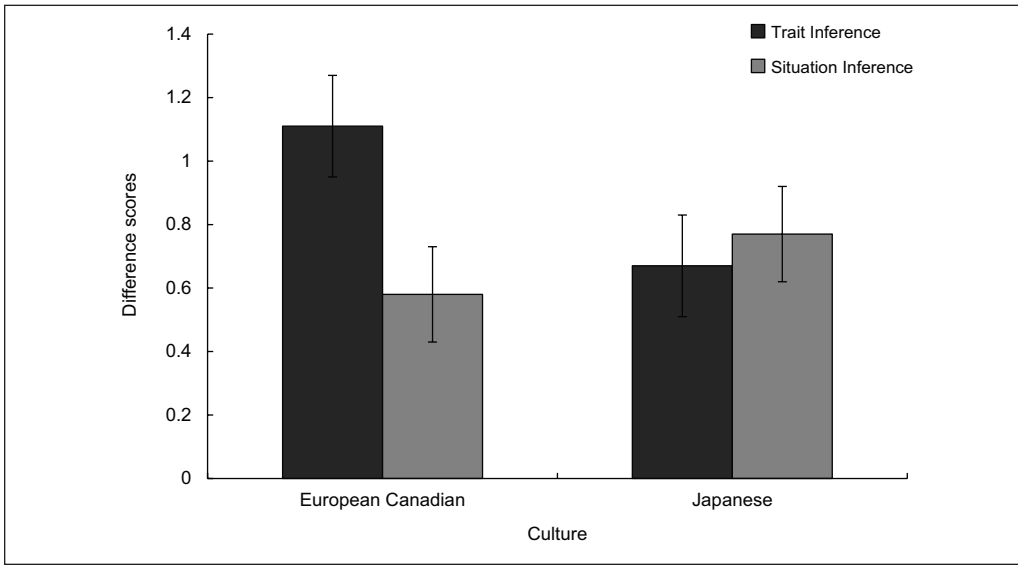

Figure 2. Difference scores between the mean number of recalled words in the match trials and the mean number of recalled words in the mismatch trials during the recall task in two cultures. Error bars represent standard errors.

was significant, $F(1, 254) = 4.26$, $p = .04$, $\eta_p^2 = .02$ (see Figure 2). Simple effect analyses revealed that spontaneous trait and situation inferences occurred for both cultural groups: the occurrence of STIs, $t(255) = 7.84$, $p < .001$, Cohen's $d = .43$; and the occurrence of SSIs, $t(255) = 6.34$, $p < .001$, Cohen's $d = .34$. European Canadians made STIs, $t(131) = 6.94$, $p < .001$, Cohen's $d = .52$, as well as SSIs, $t(131) = 3.79$, $p = <.001$, Cohen's $d = .26$. Similarly, spontaneous inferences among Japanese participants occurred for both trait words, $t(123) = 4.14$, $p = <.001$, Cohen's $d = .41$, and situation words, $t(123) = 5.25$, $p < .001$, Cohen's $d = .55$. Consistent with previous studies (Lee et al., 2015; Na & Kitayama, 2011; Shimizu et al., 2017), we found a cultural difference in the extent to which STIs occurred among European Canadian participants compared with Japanese, $F(1, 254) = 3.80$, $p = .05$, $\eta_p^2 = .02$. However, there was no cultural difference in the occurrence of SSIs, $F < 1$.

To further explore relations between spontaneous trait and situation inferences in each culture, we compared STIs with SSIs within the respective cultures. The results indicated that European

Canadians made more STIs ($M = 1.11$, $SD = 1.84$) than SSIs ($M = 0.58$, $SD = 1.74$), $t(131) = 2.41$, $p = .02$, Cohen's $d = .30$. In contrast, the occurrences of STIs ($M = 0.67$, $SD = 1.80$) and SSIs ($M = 0.77$, $SD = 1.64$) were equivalent among Japanese, $t(123) = -0.48$, *ns*, with SSIs slightly more prominent than STIs. Also, there was no correlation between STIs and SSIs in either culture. Consistent with Todd et al.'s (2011) assertion, the results suggest that these inferences occurred independently from each other; among European Canadians, $r = -.02$, $p = .82$; and among Japanese, $r = .02$, $p = .82$. That is, each inference neither facilitated nor inhibited the other.

Discussion

These findings confirm our hypotheses. First, as expected, both STIs and SSIs occurred among European Canadian and Japanese participants. Second, in addition to the commonality of spontaneous inference across cultures, there were systematic cultural variations in the magnitude of each spontaneous inference. Whereas European Canadians made more STIs than SSIs, Japanese participants made these inferences equally, suggesting that culture affects the extent to which people spontaneously infer trait and situation information from others' behaviors.

To date, many researchers have found cultural influence in the automaticity of inferring trait information from other people's behaviors (Lee et al., 2015; Na & Kitayama, 2011; Shimizu et al., 2017). However, they have not looked at how culture affects the spontaneity of inferring situation information from those behaviors. Although this study cannot suggest how trait and situation information interacts, it clearly indicates that both forms of information are available to different cultural groups in the initial stage of impression formation. Importantly, the degree of accessibility for each type of information differs depending on individuals' cultural context, reflecting how their cognition has been shaped.

Consistent with previous cross-cultural research on different social orientations and thinking styles across Western and East Asian cultures (e.g., Markus & Kitayama, 1991, 2010; Nisbett et al., 2001; Varnum et al., 2010), the patterns of spontaneous inferences in the two cultures corresponded to the existing theoretical frameworks' understanding. Apparently, European Canadians, as independent-oriented and analytic thinkers, tended to focus more on the inner characteristics (such as traits) of persons by decontextualizing the persons from their contexts, and this tendency made them more likely to infer STIs than SSIs. In contrast, Japanese, as interdependent-oriented and holistic thinkers, tended to focus both on persons and contexts by perceiving persons in relation with others and embedded in their contexts, and this tendency led them to make spontaneous trait and situation inferences from behaviors to an equal degree.

Implications

This study has three major implications. First, the findings provide clear evidence of cultural variations in the degree of spontaneous trait and situational inferences. This is the first study to show cultural variations in two different simultaneous spontaneous inferences. It is also the first to use the savings-in-relearning paradigm (Carlston & Skowronski, 1994; Carlston et al., 1995) to detect cultural differences. Thus, both the savings-in-relearning and the false recognition paradigm (Todorov & Uleman, 2002, 2003) are promising methods for cross-cultural studies of spontaneous inferences. Furthermore, spontaneous inferences occur in multiple cultures.

Second, this study adds spontaneous inferences to the list of basic perceptual and cognitive processes that show cultural variations (Imai & Masuda, 2013; Masuda, Ishii, & Kimura, 2016; Nisbett, 2003; Nisbett & Masuda, 2003; Nisbett & Miyamoto, 2005; Nisbett et al., 2001; Senzaki et al., 2014). It thus adds to the generality of the holistic/analytic framework for understanding cultural differences. Inferences are ubiquitous and central to human cognition. Because spontaneous inferences occur outside of awareness, they are basic in not being consciously monitored

(Ferreira et al., 2012) and therefore not subject to intentional moderation. They are also automatic to some degree. In fact, Shimizu et al. (2017) argued that some of the most fundamental differences among cultures are in their automatic cognitive processes.

Third, the current findings may shed light on one of the important aspects of analytic versus holistic thinking styles—abstractness versus concreteness. Previous findings suggest that adjectives facilitate speakers to think about things abstractly, whereas verbs facilitate speakers to think about things in a concrete manner (Semin & Fiedler, 1988). Maass, Karasawa, Politi, and Suga (2006) further discussed that holistic thinkers (i.e., Japanese speakers) perceive others' behaviors in relation to contexts, so the information inferred is relatively concrete. In contrast, analytic thinkers (i.e., Italian speakers) perceive others' behaviors by detaching the key concepts from the contexts, so the information inferred is more abstract. This logic is consistent with the current finding that the frequency of spontaneous inferences, in general, is greater for North Americans than for Japanese. Based on the findings in psycholinguistics (Maass et al., 2006; Semin & Fiedler, 1988), it is reasonable to assume that the lower rate of spontaneous inferences observed in Japanese data may be attributable to the fact that they retain information about others' behavior in a concrete manner using verbs (e.g., "He enjoys doing sports.") rather than adjectives (e.g., "He is athletic."). Of course, this is beyond the scope of the current article. Based on a universal tendency of STI/SSI, future research should further elucidate the potential qualitative differences in strategies for understanding human behavior.

Based on the current findings, how might we conceptualize the phenomenon of spontaneous inference and its variation across cultures? With regard to psychological universals, Norenzayan and Heine (2005) theorized four levels of phenomena: accessibility universals (the phenomenon is observable across cultures, equally used across cultures, and accessible to the same degree across cultures), functional universals (the phenomenon is observable across cultures and equally used across cultures, but accessibility differs across cultures), existential universals (the phenomenon is observable across cultures, but usage and accessibility are different across cultures), and nonuniversals (the phenomenon is observable only in specific cultural groups). Spontaneous inference may be categorized as a phenomenon of functional universals (albeit based on two samples), because in our study, both spontaneous trait and situation inferences were observed in two cultural groups, and similarly used in both cultures, but each spontaneous inference was differently accessible across the two cultures.

Limitations and Future Directions

There are several limitations of the current study. First, the current article focused only on the cultural variations in STI and SSI, and did not measure directly the mediational mechanisms of social orientations and thinking styles to explain the relationship between culture and the magnitude of STI and SSI. Researchers typically measure these concepts using self-report scales. One possible line for future research is to include existing self-report scales which measure peoples' independent versus interdependent social orientation (Kitayama & Uskul, 2011; Varnum et al., 2010) and holistic versus analytic tendency (Choi, Koo, & Choi, 2007; Spencer-Rodgers et al., 2017). However, there remain some reservations regarding this approach: such self-report measurements of those variables may not be adequate, because only weak associations between self-report scales and behavioral patterns have been empirically reported, and therefore, little consensus has been established among researchers regarding the validity of self-report measures which are supposed to associate with the target mediators (Heine, Lehman, Peng, & Greenholtz, 2002; Klein et al., 2009; Na et al., 2010; Oyserman, Coon, & Kemmelmeier, 2002).

To depict a clearer relationship between culture and spontaneous inferences, we may have to develop better measures for potential mediators, which could elucidate the mechanisms of how social orientations and thinking styles lead to specific memory patterns about people and situations.

Furthermore, recent findings in cultural neuroscience have demonstrated that cultural variations in person perception processes are observable even in people's neural responses, and such patterns are associated with existing self-report measures (e.g., Na & Kitayama, 2011; Russell et al., 2015).

To elucidate the underlying mechanism of spontaneous inferences, neuroscientific responses may be considered as alternative measures for future research. For example, Mason and Morris (2010) reviewed the social neuroscience literature on cultural differences in the automaticity of trait versus situation inferences and suggested that measuring the activity of specific brain areas such as the posterior superior temporal sulcus (pSTS) and the temporal poles (TPs) can be the key to understanding the automaticity of person perception processing across cultures. In addition, a recent study by Brosch, Schiller, Mojdehbakhsh, Uleman, and Phelps (2013) found that the left dorsolateral prefrontal cortex (DLPFC), which represents conscious processing, activates when Americans consider situation information. However, they have not looked at the activity of DLPFC cross-culturally.

Second, there are open questions on the issue of independence/relatedness of the two types of spontaneous inferences. Several researchers maintain that the occurrences of trait and situation inferences are independent from one another (e.g., Todd et al., 2011), and the current findings indicate a pattern consistent with their assertion. STI and SSI were uncorrelated, suggesting independence. However, there is an alternative possibility. The discounting/augmentation principles in classic attribution theories suggest that the two types of inferences are in a trade-off relationship (e.g., Heider, 1958; Jones & Davis, 1965). That is, on hearing the sentence "She jumped over the fence with ease," when people spontaneously infer that the agent is *athletic*, they may reduce automatic situation inference (e.g., the fence is *low*), but when they spontaneously infer that the fence is *low*, they may reduce automatic trait inference (e.g., the agent is *athletic*). Perhaps this trade-off only occurs with conscious, intentional attributions. And perhaps it does not even always occur then. Miller, Smith, and Uleman (1981) found that "situational and dispositional causes can operate either in unison or opposition in ordinary language, and hence are unlikely always to be placed in opposition by subjects" (p. 92). Although these issues are beyond the scope of the current study, future research should scrutinize the conditions and underlying mechanisms where spontaneous trait and situation inferences occur equally, where STIs become dominant, and where SSIs become dominant.

Conclusion

This is the first study to examine the simultaneous occurrence of STIs and SSIs across cultures. It is also the first to employ the savings-in-relearning paradigm (Carlston & Skowronski, 1994; Carlston et al., 1995) in cross-cultural research. Results show that STI and SSI patterns differ between Euro-Canadian and Japanese college students as predicted from the social orientation framework (Markus & Kitayama, 1991, 2010; Triandis, 1989, 1990; Varnum et al., 2010) as well as the thinking style framework (Nisbett, 2003; Nisbett & Masuda, 2003; Nisbett & Miyamoto, 2005; Nisbett et al., 2001). Thus, the current study demonstrates that these inferences occur universally but with interpretable variation across cultures.

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Note

1. We also analyzed the data by incorporating Trial Type into our design rather than using difference scores, to be sure that the difference scores were not misleading. This produces a 2 Culture (European Canadian vs. Japanese) × 2 Inference (trait vs. situation) × 2 Trial Type (relearning vs. control) repeated-measures ANOVA on the number of correctly recalled items (of the total of 40 items), with Inference and Trial Type as within-subjects variables. First, we found a main effect of trial type, $F(1, 254) = 101.35$, $p < .001$, $\eta_p^2 = .29$. Regardless of culture, participants showed better recall accuracy for the relearning trials ($M = 3.03$, $SE = 0.11$) compared with the control trials ($M = 2.25$, $SE = 0.10$), which indicates the occurrence of inferences in both cultures. We also found a main effect of culture, $F(1, 254) = 76.09$, $p < .001$, $\eta_p^2 = .23$. In general, European Canadians ($M = 3.47$, $SE = 0.13$) recalled more words than Japanese participants ($M = 1.81$, $SE = 0.14$). Most importantly, the three-way interaction was significant, $F(1, 254) = 4.26$, $p = .04$, $\eta_p^2 = .02$. Within each culture, recall means of control words for traits and situations did not differ. They were 3.06 and 3.04, respectively, for European Canadians, and 1.51 and 1.39 for Japanese. European Canadian recall of relearned trait words (4.17) was higher than relearned situation words (3.61), as Figure 1 suggests. Japanese recall of relearned trait words (2.18) did not differ from recall of relearned situation words (2.16), again as reflected in Figure 1. Thus, Figure 1's difference scores reflect spontaneous trait inference (STI) and spontaneous situation inference (SSI) accurately.

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