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BRIEF REPORT

Loving-kindness brings loving-kindness: The impact of Buddhism on cognitive self–other integration

Lorenza S. Colzato · Hilmar Zech · Bernhard Hommel · Rinus Verdonschot · Wery P. M. van den Wildenberg · Shulan Hsieh

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Abstract Common wisdom has it that Buddhism enhances compassion and self–other integration. We put this assumption to empirical test by comparing practicing Taiwanese Buddhists with well-matched atheists. Buddhists showed more evidence of self–other integration in the social Simon task, which assesses the degree to which people co-represent the actions of a coactor. This suggests that self–other integration and task co-representation vary as a function of religious practice.

Keywords Buddhism · SSE · Self-other integration

L. S. Colzato · H. Zech · B. Hommel · R. Verdonschot
Cognitive Psychology Unit & Leiden Institute for Brain and Cognition, Leiden University,
Leiden, The Netherlands

W. P. M. van den Wildenberg
Amsterdam Center for the Study of Adaptive Control in Brain and Behaviour (Acacia) Psychology Department,
University of Amsterdam,
Amsterdam, The Netherlands

S. Hsieh
Department of Psychology and Institute of Cognitive Science,
National Cheng Kung University,
Tainan City, Taiwan

L. S. Colzato (✉)
Department of Psychology, Cognitive Psychology Unit,
Leiden University,
Wassenaarseweg 52,
2333 AK Leiden, The Netherlands
e-mail: colzato@fsw.leidenuniv.nl

Introduction

Zen Master Dogen (1976) said: "To forget the self is to be enlightened by all things, to be enlightened by all things is to remove the barriers between oneself and others". The concept of *anatta* is a core Buddhist teaching that denies the existence of a separate self: According to this doctrine, there is no "self" in the sense of a permanent, integral, autonomous being within an individual existence. What we think of as our self, our personality and ego, are temporary creations, if not delusions (Dalai Lama, 2007). Similarly, in the Western culture, David Hume (1739) proposed the non-existence of a continuous self. According to him, the self is nothing but a bundle or collection of perceptions, a continuous flow of sensations that represent the perceiver and his or her self only by virtue of the fact that he or she is having the sensations. This perceptual concept of the self, which amounts to what in philosophical discussions is featured under the term "minimal self" (Gallagher, 2000), suggests that there may be nothing special about representing oneself (or another person). Hence, the cognitive system may represent oneself as just another event—that is, as an integrated network of codes representing one's own perceptual features (Hommel, Colzato, & van den Wildenberg, 2009).

From such a perceptual approach, removing "the barriers between oneself and others" by Buddhist practice would amount to a loss of discrimination between the representation of oneself and the representations of others—that is, to an increase of self–other integration. The present study put this assumption to empirical test by comparing practicing Buddhists and otherwise well-matched atheists with respect to two dependent measures: the Inclusion of Other in the Self (IOS) scale, which assesses the perceived inclusion of

the other in one's self (Aron, Aron, & Smollan, 1992), and the social Simon effect (SSE; Sebanz, Knoblich, & Prinz, 2003). The SSE has been reported in studies where pairs of participants carry out an interactive Simon task (Simon, 1969): One participant presses a left key in response to one of two possible stimuli (such as the color of a visual stimulus), and the other participant presses a right key in response to the alternative stimulus—a kind of social go/no-go task. With this setup, people are commonly faster if the stimulus spatially corresponds to the location of their response key than if it corresponds to the other key. Given that correspondence does not (or hardly) affect performance if people carry out this go/no-go task on their own (Hommel, 1996), the SSE suggests that people consider the other person's action in their own representation of the current task.

Interestingly, the mere presence of another person is insufficient for the SSE to occur if this person is not involved in the task (Sebanz et al., 2003) or is perceived as intimidating and unfriendly (Hommel et al., 2009). This suggests that the SSE can be considered to indicate the degree to which the participant has integrated another person's actions into his or her own task representation (Hommel et al., 2009; Sebanz et al., 2003). If practicing Buddhism affects the degree to which people integrate other people with their own self-concept, one would expect evidence of stronger self–other overlap in the IOS and a more pronounced SSE in Buddhists as compared with atheists.

However, even though more self–other overlap should increase the SSE, not every increase of the SSE needs to reflect self–other integration. For instance, by using a Navon (1977) global–local task, Colzato, Hommel, van den Wildenberg, and Hsieh (2010) found that practicing Buddhists exhibit a stronger tendency to attend to the global, rather than local, attributes of visual stimuli. On the one hand, a more global attentional orientation in Buddhists might reduce self–other discrimination, which would also predict a more pronounced SSE in Buddhists. On the other hand, however, in the Navon task, a greater global bias implies greater difficulty in ignoring global information if it is irrelevant. Hence, the findings of Colzato et al. might be taken to indicate that Buddhist practice simply leads to greater difficulty in ignoring task-irrelevant information, and indeed, Buddhist meditation emphasizes the broad, nonevaluative acceptance of all perceived information (Dalai Lama, 2007). Given that the actions of a coactor in an interactive Simon task play no role in one's own performance, taking these actions nevertheless into consideration (i.e., producing an SSE) can certainly be seen as a failure to exclude irrelevant information from processing, so that a more pronounced SSE in Buddhists might reflect a lack of attentional control, rather than self–other integration. To distinguish between these two possible accounts, we also included a standard, noninteractive Simon task. Given that the stimulus location is irrelevant in this task, a lack of attentional control would be expected to increase the impact of this feature on response selection. In other words, an attentional control account would predict that Buddhists exhibit both a greater SSE and a more pronounced standard Simon effect. If, however, Buddhists show a greater SSE but a normal noninteractive Simon effect, self–other integration would be more likely at work.

Method

Forty healthy young Taiwanese adults participated for partial fulfillment of course credit or a financial reward (NT $250=US$8). They constituted two experimental groups: atheists and Buddhists (all active members of Buddhist organizations such as the Tzu Chi Foundation, Bliss Wisdom Club, and Amida Society). Following Colzato et al. (2010), all participants were matched in terms of ethnicity (100 % yellow race), culture (100 % Taiwanese), age, sex, and IQ (see Table 1 for demographic data and religious behavior). Both groups were educated in Taiwan according to the same educational style and reported similar social-economic backgrounds. Written informed consent was obtained from all participants after a detailed explanation of the study procedures. The study was approved by the institutional review board.

The experiment consisted of a 20-min session in which participants made speeded discriminative responses to the color of the circle. After one practice block, in the *noninteractive condition* (two 60-trial blocks), participants operated both response keys by responding left to a green circle and right to a blue circle. In the *interactive condition* (three 60-trial blocks), they pressed only one key, while the other key was operated by the other participant. All pairs consisted of one Buddhist and one atheist, so as to minimize possible asymmetries and artifacts related to familiarity (since members of the Buddhist community were more likely to know each other) and context or expectations (since being with another Buddhist might remind Buddhists of their shared convictions and behavioral rules).

Circles stayed on the screen until the response was given or 1,500 ms had passed. Circles (diameter of 43 pixels) were equiprobably presented to the left or right (at a distance of 50 pixels) of a central fixation point (12 pixels) until the response was given or 1,500 ms had passed. Intervals between subsequent stimuli varied randomly, but equiprobably, from 1,750 to 2,250 ms in steps of 100 ms. Participants were to ignore the location of the stimulus and to base their response exclusively on its color. Responses were to be given as quickly as possible while keeping error rates below 15 %, on average; feedback was provided at the end of a trial block.

Table 1 Demographic characteristics, religious behavior, questionnaires and tests scores, and mean reaction times and error rates as a function of group and spatial stimulus–-response (S–-R) correspondence. (with standard deviations in are presented within parentheses)

Sample	Buddhists	Atheists
N (M:F) [ns]	20 (12:8)	20 (9:11)
Age (years) [ns]	23 (3.7)	22 (3.3)
Raven IQ [ns]	123 (2)	120 (2)
Years of education [ns]	13.2 (0.6)	13.6 (0.6)
Beck Anxiety Inventory [ns]	5.2 (4.2)	8.6 (10.4)
EPQ-E [ns]	8.7 (2.9)	7.6 (2.4)
EPQ-N [ns]	5.1 (3.0)	5.0 (3.5)
Members of religious groups (Yes:No)**	20:0	0:20
Religious cause for being vegetarian**	11:9	0:20
Active participation in religious activities**	16:4	3:17
Visit to temple (weekly)*	9:11	3:17
Zen meditation (Yes:No)*	7:13	0:20
Daily prayer (Yes:No)	3:17	0:20
Short-term living in a monastery (Yes:No)*	4:16	0:20
Social value orientation category		
Prosocial [ns]	13	9
Individualistic [ns]	4	6
Competitive [ns]	0	0
Unclassified [ns]	3	5
S–R correspondence noninteractive		
Reaction times (ms)	392 (39)	402 (41)
Error rates (%)	4.6 (0.04)	4.2 (0.04)
S–R noncorrespondence noninteractive		
Reaction times (ms)	404 (33)	421 (34)
Error rates (%)	6.1 (0.07)	3.2 (0.04)
S–R correspondence interactive		
Reaction times (ms)	335 (39)	329 (23)
Error rates (%)	0.1 (0.1)	0.1 (0.1)
S–R noncorrespondence interactive		
Reaction times (ms)	353 (38)	339 (29)
Error rates (%)	0.1 (0.1)	0.3 (0.1)
Social Simon effect *	18	10
Inclusion of other [ns]	3.9 (2.1)	3.6 (2.0)

Note. Raven IQ,: IQ measured by means of the Raven's Standard Progressive Matrices;

EPQ–-E,: Eysenck's personality questionnaire–-extraversion ;

EPQ–-N,: Eysenck's personality questionnaire–-neuroticism

[ns] Nonsignificant difference

* $p < 0.05$

** $p < 0.01$

After finishing the task, participants were asked to fill out the social value orientation scale task (van Lange, Otten, de Bruin, & Joireman, 1997) to quantify prosocial, individualistic, and competitive behaviors and the IOS to measure the specific notion of closeness as including others in the self (Aron et al., 1992). Moreover, to allow for matching the two groups in terms of anxiety levels, personality traits, and general intelligence (factors that may affect the SSE), the participants completed the Beck Anxiety Inventory (BAI; Beck & Steer, 1990), Eysenck's personality questionnaire (EPQ-RSS; Eysenck & Eysenck, 1991), and the Raven's Standard Progressive Matrices (SPM; Raven, Court, & Raven, 1988) intelligence test, respectively.

Results

A significance level of $p < .05$ was adopted for all tests. To test for group effects on age, IQ, sex, and questionnaire and test scores, *t*-tests and chi-squre tests were performed. Mean reaction times (RTs) and error rates were analyzed by means of ANOVAs as a function of group (Buddhists vs. atheists) as a between-participants factor and spatial stimulus–response correspondence (correspondence vs. noncorrespondence) as a within-participants factor for both the noninteractive and interactive conditions.

First, no significant group differences were obtained for age, intelligence, sex, personality traits, and anxiety level (see Table 1). Buddhists showed a tendency toward higher score on the IOS and more prosocial behavior than did atheists, but this effect fell below the significance criterion.

We analyzed the two noninteractive experimental blocks to test whether all participants showed a standard (i.e., noninteractive) Simon effect. Only correspondence produced a reliable effect on RT, $F(1, 38) = 22.74$, $p < .0001$, whereas the effects of group and the group × correspondence interaction did not, all Fs$(1, 38) < 1$. In both groups, responses were faster and more accurate with stimulus–response correspondence (402 ms and 3.2 % for the atheist group and 392 ms and 4.6 % for the Buddhist group) than with noncorrespondence (421 ms and 4.2 %, and 404 ms and 6.1 %, respectively). Thus, both experimental groups showed comparable standard Simon effects on RTs and error rates (see Table 1).

Next, we analyzed the data from the interactive Simon blocks in the same way. A main effect of correspondence on RT, $F(1, 38) = 49.44$, $p < .0001$, indicated that responses were generally faster with stimulus–response correspondence than with noncorrespondence (333 vs. 346 ms). Overall, error percentages on corresponding trials (0.2 %) and noncorresponding trials (0.3 %) were comparable and did not differ between groups (Fs < 1). More important, a significant interaction indicated that the correspondence effect on RT differed between groups, $F(1, 38) = 4.73$, $p = .036$. Even though the correspondence effect was reliable in both Buddhists, $F(1, 19) = 34.04$, $p = .0001$, and atheists, $F(1, 19) = 15.61$, $p = .001$, SSE was significantly more pronounced in Buddhists (see Table 1).

Discussion

As was expected, the SSE was more pronounced in Buddhists than in atheists, and the IOS revealed a trend toward more self–other overlap in Buddhists. At the same time, the noninteractive Simon effect was comparable in the two groups, suggesting that the effect of religion was specific to the SSE. Note that our participants performed the noninteractive condition immediately prior to the interactive condition. This means that the no-go response in the interactive Simon task was associated with a stimulus that in the preceding noninteractive task required a response from the participant. On the one hand, this might have boosted the SSE effect, even though the sizes of our SSEs seem comparable to those in other studies. On the other hand, however, exactly the same method was applied in both groups and cannot, therefore, account for the obtained group effects on the SSE. Hence, taken together, the pattern of our findings is more likely to reflect the possibility that practicing Buddhism enhances self–other integration (Dogen, 1976), rather than merely reduced attentional control.

It is important to point out that, even though we took efforts to match the two groups with respect to the most obvious variables, our quasi-experimental design does not allow ruling out self-selection factors—that is, factors that might have mediated the choice of participants to practice or not practice Buddhism. However, given that peoples' membership in a religious group commonly reflects more the social and cultural context and commitments of their parents, rather than their individual choice, it is not obvious which self-selection factors might have been at work in the present case. This would suggest that Buddhist practice changes the way people cognitively represent themselves vis-à-vis others. Indeed, Buddhism is based on the concept of compassion and open presence (Guenther, 1993), which emphasizes the connectedness between self and other (which plays an important role in many Asian cultures anyway; Nisbett & Miyamoto, 2005) and is likely to have direct implications for the way information about oneself and other people is being processed.

But how might such information be processed, and exactly how might it be affected by practice? As was suggested by Hommel et al. (2009), people may represent themselves and others through networks of hierarchically organized feature codes representing increasingly more detailed characteristics of the individuals involved. As with objects and other nonsocial events, this would allow focusing attention either on local details (e.g., gender and dress), which would emphasize the distinction between self and other, or on more global representational levels (e.g., that you and me are both living beings or human), which would emphasize commonalities. Applying the concept of compassion—and rewarding individuals (i.e., Buddhists) for showing behavior consistent with this concept—would be more likely to propagate the latter and induce a more global (i.e., higher-level) attentional set as default. This would fit with our previous observation that Buddhists show a more pronounced global-precedence effect in visual attention (Colzato et al., 2010) and would account for our present finding of a more pronounced SSE in Buddhists. Hence, practicing Buddhism might indeed bias attentional control toward particular subsets of control parameters (Hommel, Colzato, Scorolli, Borghi, & van den Wildenberg, 2011) and corresponding characteristics of attentional sets.

With respect to the mechanisms underlying the SSE, our present observations suggest that the tendency to include other people's actions in one's own task representation is not as automatic as Sebanz et al. (2003) have assumed. Rather, self–other integration seems not only to be a function of the current situation and the interpersonal relationship (Hommel et al., 2009), but also to be affected by one's religious belief—and, arguably, of the attentional preferences it induces. In an interactive Simon task, a reduced tendency to discriminate between self and other implies reduced discrimination between one's own action and the actions of a coactor. Since proper responding does require such discrimination (to make sure that one's own action is carried out in response to the stimulus it is assigned to; see Dolk et al., 2011), and since the most obvious distinction between the two responses is their relative location, it is likely that participants are using the horizontal dimension to code their own action as left or right in reference to the coactor's action (Guagnano, Rusconi, & Umiltà, 2010). Interestingly, this scenario suggests that, even though the SSE is certainly affected by (and thereby reflects) social factors, it may actually not really be social in nature. Indeed, Dolk et al. (2011) have suggested that spatial response coding and, as a consequence, an SSE may be induced by any kind of event—social or nonsocial—if only it is sufficiently salient to require discrimination from the participants own action "event" and providing a horizontal spatial reference. Obviously, the action of another individual is particularly salient, but nonsocial events may be sufficiently salient as well. With respect to our present findings, we suggest that "removing the barriers between oneself and others" through Buddhist practice can be considered to enhance the relative saliency of the other: The more you and I are one, the more difficult it becomes to discriminate between what you do and what I am doing—which in the case of an interactive Simon task, introduces relative location as a handy basis for such a discrimination.

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