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Can Culture Influence Body-Specific Associations Between Space and Valence?

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Abstract

People implicitly associate positive ideas with their dominant side of space and negative ideas with their non-dominant side. Right-handers tend to associate "good" with "right" and "bad" with "left," but left-handers associate "bad" with "right" and "good" with "left." Whereas right-handers' implicit associations align with idioms in language and culture that link "good" with "right," left-handers' implicit associations go against them. Can cultural conventions modulate the body-specific association between valence and left-right space? Here, we compared people from Spanish and Moroccan cultures, which differ in the strength of taboos against the use of the left hand, and therefore in their preference for the right. Results showed stronger explicit associations between space and valence in Moroccan participants than in Spaniards, but they did not show any increased tendency for right-handed Moroccans to associate "good" with "right" implicitly. Despite differences in cultural conventions between Spaniards and Moroccans, we find no evidence for a cross-cultural difference in the implicit association between space and valence, which appears to depend on patterns of bodily experience.

Keywords: Conceptual metaphor; Body specificity; Culture; Cultural conventions; Arabic; Moroccan; Western; Handedness; Emotional valence

1. Introduction

Many languages and cultures associate the right side of space with good things and the left side with bad things. This pattern is revealed in linguistic expressions like "my right-hand man" and "two left feet," and in cultural conventions requiring people to eat or gesture with the right hand rather than the left (McManus, 2002). However, in spite of exposure to the same cultural and linguistic patterns, left-handers tend to associate "left"

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with positive ideas and "right" with negative ideas, whereas right-handers show the culturally licensed mapping. Thus, each group associates "good" more strongly with their dominant side, a body-specific effect on conceptual structure (Casasanto, 2009). Similar results have been found in children as young as 5 years old (Casasanto & Henetz, 2012) and in the gestures made by politicians (Casasanto & Jasmin, 2010; Casasanto, 2011, for review).

Brunyé, Gardony, Mahoney, and Taylor (2012) showed that the body-specific implicit association between space and valence can produce biases in memory for spatial locations of positive and negative events on a map. Right-handers misremembered positive events as having occurred farther to the right and negative events as having occurred farther to the left of their correct locations; left-handers showed the opposite bias. De la Vega, De Filippis, Lachmair, Dudschig, and Kaup (2012) and Kong (2013) observed body-specific effects on bimanual valence judgments in reaction time tasks. Because there are no cultural or linguistic conventions that link the left with good things, neither cultural nor linguistic experience can explain the body-specific effect in left-handers. Rather, bodily differences determine the direction of space–valence associations. People implicitly associate positive ideas with their dominant side of space because they can interact with the environment more fluently on this side using their dominant hand, and associate negative ideas with the non-dominant side because they interact with the environment more clumsily on this side, using their non-dominant hand (Casasanto, 2009; Casasanto & Chrysikou, 2011; Ping, Dhillon, & Beilock, 2009).

It would be natural to assume that the good-is-right association in right-handers would be stronger than the good-is-left association found in left-handers: For right-handers, patterns of bodily experience reinforce patterns of linguistic and cultural experience, but for left-handers these different streams of experience contradict one another. Surprisingly, however, the strength of the association between dominant side and positive valence has been found to be stronger in left-handers than in right-handers—a trend observed across several laboratory experiments (Casasanto, 2009; Casasanto & Henetz, 2012) and in an observational study of spontaneous gestures (Casasanto & Jasmin, 2010). On the basis of these results in English and Dutch speakers, it appears that cultural conventions linking "good" with "right" play no role in establishing the conceptual mapping between lateral space and the good and the bad.

Yet the left–right conventions in English and Dutch culture may not be as strong as in some other cultures. In English and Dutch, left is associated with clumsy, but not necessarily with filthy or evil. Arabic culture, among others, has stronger conventions in favor of the right and against the left. In Arabic culture, there are taboos against the left that apply to everyday activities. For example, Muslims should never use their left hand for eating or drinking because it represents the bad, twisted, dark, and dirty. The left hand can only be used during defecation or other dirty activities (Mateo, 2010; Westermack, 1926). If culture plays a role in establishing implicit associations between lateral space and affective evaluation, its effect should be more detectable in the Arabic culture than in the cultures tested so far, which lack stringent taboos against the left. Alternatively, if these associations depend on bodily attributes, alone, then the magnitude and direction of

implicit space–valence effects should be similar across cultures, despite differences in their explicit taboos. To distinguish these possibilities, here we compared the mapping between left–right space and positive–negative valence in Spaniards living in Spain and Moroccans living in Morocco.

2. Experiment 1: Space–valence associations in Spaniards

Our first step was to replicate Casasanto's (2009) findings in Spanish right- and left-handers. We did not expect space–valence associations in Spaniards to differ from those reported previously in American and Dutch groups (Casasanto, 2009), since linguistic and cultural conventions linking "right" and "left" with "good" and "bad" are similar across these Western cultures; rather, the Spaniards provided a comparison group for the Moroccan participants we tested in Experiment 2, who have more stringent left-hand taboos (Mateo, 2010; Westermack, 1926).

2.1. Method

2.1.1. Participants

The Spanish group consisted of 29 Psychology students of the University of Granada (mean age 23.13, range 20–31): 9 left-handers (7 females) and 20 right-handers (6 females). All of them were native Spanish, had never lived in an Arabic country for longer than an occasional stay, and did not know any Arabic language.

2.1.2. Procedure

We used a Spanish version of Casasanto (2009; Experiment 3), which we hereafter refer to as the Bob task. This task has already been used in several published studies (Casasanto, 2009; Casasanto & Chrysikou, 2011; Kominsky & Casasanto, 2013), and it is well established as a measure of implicit associations between lateral space and emotional valence.

The participants were presented with a sheet depicting a cartoon character seen from above with a box on the left and another on the right (see Fig. 1). They were told that the character (named Bob in the original studies—Juan or Mohamed in the present studies, depending on the participant's culture) was planning a trip to the zoo and that he loves zebras and thinks they are good but hates pandas and thinks they are bad (or vice versa, as animal-to-valence assignment was counterbalanced). Participants were instructed to place the good animal in the box corresponding to good things, and the bad animal in the box corresponding to bad things. Responses were given orally and without visual support from the diagram sheet, to prevent manual responses (e.g., pointing). Both order of mention of the two animals and order of questions about the good and the bad animal were counterbalanced, what rules out concerns related to priming effects linked to order of mention or putative tendencies to start with the good or the bad animal.

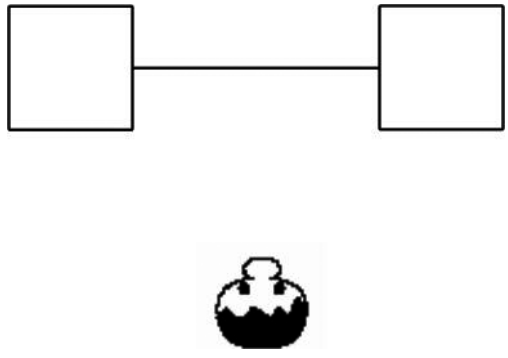

Fig. 1. The diagram sheet presented to participants.

After completing this task, the participants answered five debriefing questions: the first two questions were fillers ("Are you studying Spanish or French?" and "If you had to choose, would you say that today it will be rainy or sunny?"), followed by one relevant debriefing question ("Why do you think you placed the good animal in the box that you did?"). After one more filler question ("If you had to choose between keeping animals in the zoo or letting them stay free, what would you choose?"), there was a final debriefing question ("Do you think that the side of your dominant hand might have influenced your decision to place the good animal in the box that you chose?"). After the questions, the participants were asked to report their handedness.

2.2. Results and discussion

The final debriefing question was used to filter out those participants that suspected a relation between handedness and their choice of location for the good and bad animals (two participants, both of them right-handed). All analyses were run on the remaining participants.

A majority of left-handers (77.8%) assigned the good animal to the box on the left of the character, whereas a majority of right-handers assigned the good animal to the box on the right (66.7%; $p = 0.04$ by Fisher's exact test[1]; see Fig. 2). Thus, there were significant differences between right- and left-handers in their space–valence associations: The majority of participants placed the good animal in the box on their dominant side. The strength of this preference in left- and right-handers (77.8% vs. 66.7%) was not significantly different ($p = 0.67$ by Fisher's exact test). The bias in each group did not differ significantly from chance in a Sign test (right-handers: $p = 0.23$; left-handers: $p = 0.18$), in spite of showing significantly different preferences between them. Studies 2 and 3, using larger sample sizes, did find significant within-group biases.

To summarize, data from this study replicate Casasanto's (2009) body specificity findings: Spanish right- and left-handed participants differed in the tendency to associate positive valence with left and right space, and did so in a way that was congruent with

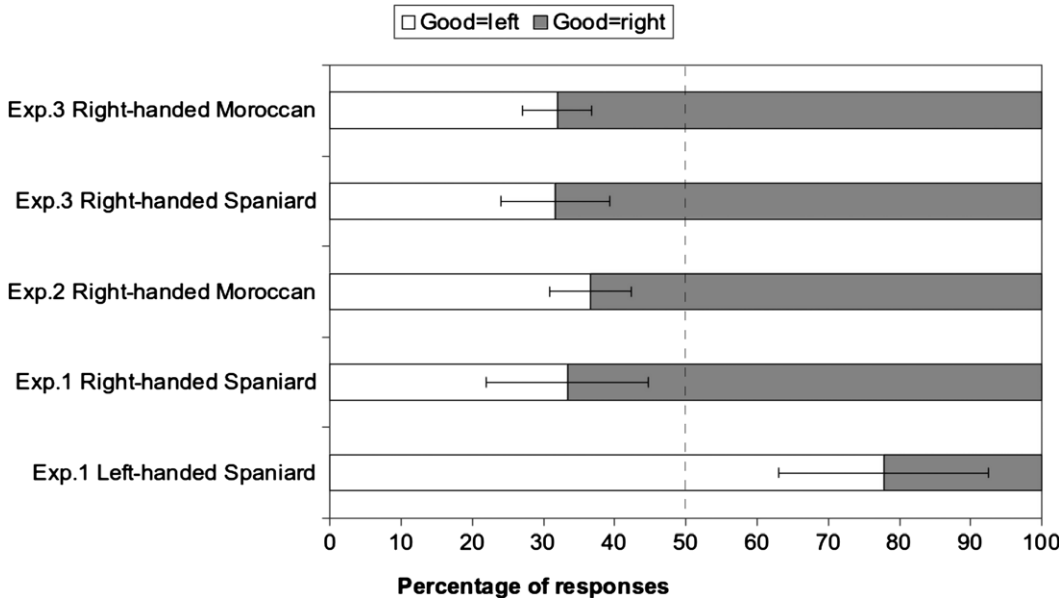

Fig. 2. Proportion of good-is-right responses in Spaniards and Moroccan Arabs in Studies 1–3. The vertical dotted line indicates chance responding.

their handedness. Will Moroccan participants, who grow up in a culture that holds strong taboos against the left and in favor of the right, show the same pattern?

3. Experiment 2: Space–valence associations in Moroccan Arabs

To answer this question, we tested a group of Moroccan participants in Morocco on the same task and compared it to the Spanish participants of Study 1. The test was administered in the local Arabic language (Darija) while participants were immersed in an Arabic culture (Moroccan). We also improved the handedness measure, changing to an implicit 4-point scale (see details below).

3.1. Method

3.1.1. Participants

Forty students (15 females; age range 19–30 years) from the University Abdelmalek Essaadi at Tetouan (Morocco) were paid for their participation. All of them were born in Morocco and had never resided in a Western country (with two exceptions: one participant was born and lived in Spain up to age 3, and another lived in Gibraltar up to age 9). All of them were either native speakers of Darija or highly fluent in this language. We did not find any left-handers.

3.1.2. Procedure

The procedure was the same as in Experiment 1, with the exception that materials were translated into Darija. The final self-report of handedness was removed. Instead, we devised an implicit handedness test with four items. A ball was placed on a table in front of the participant, who was asked to grab it and throw it to the experimenter. Then a blackboard, a piece of chalk, and an eraser were placed on the table, and the participant was asked to write his or her name, and then to erase it. Finally, a cardboard tube was placed on the table and the participant was asked to grab it and look through it. The hand used to grab the ball, chalk, eraser, and tube was recorded. The implicit handedness test was designed to reveal participants' true handedness even if they would be inclined to conceal left-handedness when questioned explicitly. A subsample of 24 participants also responded to an oral version (in Darija) of the Edinburgh Handedness Inventory (EHI; Oldfield, 1971) after completing the implicit laterality test.

3.2. Results and discussion

Two participants were filtered out because they reported at debriefing that handedness was related to their response. The implicit laterality measure revealed no left-handers. Only seven participants of 38 used the left hand for one item of the implicit measure. No participant used the left hand for more than one item. The EHI provided converging results in the subsample that responded to both laterality measures.

A majority of right-handers (68.4%) placed the good animal in the box on the right, showing a significant good-is-right bias (Sign test on 26 vs. 12, $p = 0.03$), as in previous versions of this experiment run in Westerners. Results in these Moroccan right-handers did not differ significantly from the Spanish right-handers in Study 1; the proportion of good-is-right responses was nearly identical to the proportion found in the Spanish group (66.7%, difference = 1.7%, $p = 1.0$, by Fisher's exact tests; see Fig. 2). Thus, monocultural Arabic right-handers immersed in their culture and language show no increase in the strength of the implicit association of "right" with "good."

4. Experiment 3: Expanding the sample

Experiments 1 and 2 showed equally strong tendencies to locate good things on the right and bad things on the left in Spanish and Moroccan right-handers in a task that assessed their implicit space–valence associations. This suggests that culture does not affect the implicit manifestation of space–valence associations, which might be determined only by asymmetric motor fluency. It might be argued, though, that the Bob task may not have enough sensitivity to capture what might be small differences between groups. We do not believe this is the case, because prior studies have shown that the Bob task is able to detect significant differences with samples as small as 13 subjects (five right-hemisphere stroke patients versus eight left-hemisphere stroke patients; see Casasanto & Chrysikou,

2011). However, to conduct a second, more powerful test of cross-cultural differences, we expanded our sample size in Study 3.

4.1. Method

4.1.1. Participants

A total of 165 people participated in Study 3. A new sample of 94 Moroccan participants (51 females; 28.4 mean age; 18–42 age range) was obtained from the same population: they were all students of Arts degrees at Abdelmalek Essaadi University, Tetouan. They all reported to be born in Morocco and having never lived in another country. All of them were native speakers of Darija. Despite collecting a large sample, we still found no left-handers.

An additional sample of 71 right-handed Spanish participants (35 females; 22.8 mean age; 18–46 age range) was also assessed. Fifty of them were students of Arts degrees at the University of Granada, and 21 were non-students from a convenience group at an Airsoft club. The two groups of Spaniards did not differ in their proportion of good-is-right responses (60% vs. 71.4%, $p = 0.43$ by Fisher's exact test), so they were treated as a single group in all following analyses.

4.1.2. Procedure

Materials and procedures were the same as in the two prior studies, with the exception of the assessment of handedness, which was done by means of the EHI (Oldfield, 1971) at the end of the session. Moroccan participants responded to an oral version (in Darija) of the EHI, whereas Spanish participants filled up a Spanish written version.

4.2. Results

No participant guessed a relation between their choice in the Bob task and handedness at debriefing, so data from all of them were included in the analyses. Replicating prior findings, both Spanish and Moroccan right-handers showed a significant bias toward placing the good animal on the right (Spanish: 45 good-right vs. 26 good-left responses, $p = 0.03$; Moroccan: 64 good-right vs. 30 good-left responses, $p = 0.0006$; both by Sign test; see Fig. 2). Importantly, the two groups did not differ in the strength of their bias ($p = 0.62$ by Fisher's exact test).

To further increase statistical power, the two groups in Study 3 were pooled together with the right-handed groups in the two prior studies, rendering a total sample of 89 Spaniards and 132 Moroccans. The good-right bias was again significant in both groups (Spanish: 57 good-right vs. 32 good-left responses, $p = 0.01$; Moroccan: 90 good-right vs. 42 good-left responses, $p = 0.00004$; both by Sign test), but the difference between groups was far from significant ($p = 0.56$ by Fisher exact test).

Finally, to test whether Moroccans might show a culture-specific bias if compared to an even *larger sample* of Westerners, we combined our Spanish data with previously published data from the same task run in 80 Dutch right-handers (Casasanto, 2009, Exp. 3).

The expanded Western group again showed a clear good-right bias (103 good-right vs. 66 good-left responses, $p = 0.006$ by Sign test) which did not differ from the bias shown by the total sample of Moroccan participants ($p = 0.23$ by Fisher exact test).

In a further analysis of the debriefing data, we tested whether the *explicit association* between right and good is stronger in our Moroccan participants than in the Spanish group. We analyzed the debriefing question: "Why do you think you placed the good animal in the box that you did?" The participants were the total sample of right-handed Spanish and Moroccan participants ($n = 221$). We coded the answer as 1 if the participant made an explicit reference to the culture-based association between right and good (e.g., "because good things must go on the right," or "because the right is good"); otherwise, we coded the answer as 0. We then compared the proportions between the two groups.

Culture predicted the rate of explicit good-is-right explanations at debriefing. The rate of responses invoking the normative good-is-right convention was 18 of 89 (20.2%) in the Spanish group, but 90 of 132 (68.2%) in the Moroccan group ($p = 0.0001$ by Fischer exact test). Moroccan participants explicitly invoked the cultural convention that links right with good and left with bad when explaining their choices in the Bob task much more often than Spanish participants.

5. General discussion

This study investigated the roles of cultural and bodily experiences in determining the implicit association between emotional valence and lateral space in Spaniards and Moroccans. Results in Spaniards showed the body-specific implicit association between space and valence observed previously in Dutch, German, and American samples. Specifically, in Experiment 1 Spanish right-handers and left-handers differed in their choice of side for valenced objects, each group favoring their dominant side, replicating and extending Casasanto's findings (2009, Exp. 3). If cultural experiences affect this association, the strength of the good-is-right mapping should be greater in Arab cultures, which hold stronger values in favor of the right and against the left. Contrary to this possibility, implicit space–valence associations in Moroccan participants were indistinguishable from those found in Spaniards and in other Western samples. In Experiment 2, right-handed Moroccans showed a good-is-right pattern of responses in the Bob task that was nearly identical to the Spaniards'. Experiment 3 showed similar results with much larger samples of right-handed participants from both cultures. Furthermore, the good-is-right bias remained statistically indistinguishable across cultures even when the Spanish group was supplemented by a sample of Dutch participants from a prior study using a similar task (Casasanto, 2009, Exp. 3). Even when tested with large samples, the implicit association between "good" and "right" appears to be no stronger in Moroccans than in participants from Western cultures, despite the fact that Moroccan culture has stronger beliefs about the association between right and good (and left and bad).

It is unlikely that the lack of difference between groups was due to a ceiling effect, since the rate of good-is-right responses found in the Westerners (60.9%) was far from the theoretical ceiling of 100%, which the Moroccans could have shown. Indeed, if only 75% of the Moroccans had shown a good-is-right bias, this result would also have been significantly different from the Westerners' ($p = 0.006$ by Fisher's exact test for this hypothetical comparison). In short, the Westerners' results left plenty of "head room" for the Moroccans to show a difference, but they did not show any. Furthermore, as this hypothetical comparison illustrates, our finding of no significant difference between Western and Moroccan right-handers was not due to any lack of statistical power. Significant between-group differences on the Bob task have been reported previously for samples as small as 13 participants in both groups, combined (Casasanto & Chrysikou, 2011, Experiment 1). The present results indicate that the strength of the implicit good-is-right bias in right-handers does not differ between Westerners and Moroccan Arabs.

What does appear to differ between cultures, however, is the strength or salience of the *explicit* good-is-right mapping. When asked to explain their responses during debriefing, Moroccans were far more likely than Spaniards to invoke the normative assumption that "right" is "good." In light of the availability of this trope, and of the strong taboos regarding the left hand and its negative connotations in Arab culture, it is remarkable that about one of every three Moroccan participants gave a *good-is-left* response in the Bob task in the present studies. Together, the results of the Bob task and the post-task debriefing suggest a dissociation between implicit space–valence associations and explicit space–valence associations in Arab culture, echoing the dissociation between implicit and explicit space–valence associations evidenced by Western left-handers.

Why do we believe that the Bob task indexes implicit space–valence associations, which are different from the explicit beliefs that the participants communicated at debriefing? Although the Bob task requires explicit judgments about space and valence, several lines of evidence indicate that most participants are unaware of the factor that explains the majority of the variance in their judgments: asymmetries in manual motor fluency. As in previous studies using this task, only a small minority of our participants guessed that their responses had something to do with their handedness: four of 234 participants (less than 2%). Yet, across several replications of the Bob task (e.g., Casasanto, 2009), handedness predicts participants' responses: Unlike right-handers, left-handers tend to indicate that the "good" animal should go in the left box. The left-handers' modal responses cannot be based on explicit good-is-left conventions in language or culture; only good-is-*right* conventions have been documented.

Further studies underscore the dissociation between responses in the Bob task and explicit conventions. Casasanto and Chrysikou (2011) showed that right-handers can be induced to associate "good" with "left" implicitly if their left hand becomes more dexterous than their right, due to long-term motor impairment or short-term motor training. In one experiment, they administered the Bob task to hemiparesis patients who lost the use of one side of their body following a contralateral stroke, all of whom were right-handed prior to brain injury. Of the left-hemiparesis patients, whose right hands remained functional, 100% placed the "good" animal in the right box. Of the right-hemiparesis patients,

however, who lost the use of their right hands, 88% placed the good animal in the left box. All patients denied any connection between their Bob responses and their pre- or post-morbid hand dominance, even when asked about such a connection explicitly. In a second experiment, Casasanto and Chrysikou randomly assigned right-handers to perform a fine motor task while wearing a cumbersome ski glove on one hand or the other. Of the participants who wore the glove on their left hand during this training phase, 77% subsequently placed the "good" animal in the right box. Of the participants who wore the glove on their right hand during training, reversing their usual manual motor asymmetry, a significant majority (63%) placed the "good" animal in the left box, like natural left-handers. Participants were more than five times more likely to place the "good" animal in the box on the side of the hand that had been free during training than on the side of the hand that had been gloved. Of the 55 participants, only two suspected any connection between the motor training task and the Bob task; over 95% of the participants were unaware of the motoric factor that explained the majority of the variance in their decisions. Importantly, Casasanto and Chrysikou's participants with impaired right hands could not have given good-is-left responses on the basis of explicit conventions in language or culture. By changing their usual asymmetry in manual motor fluency, strokes and ski gloves changed participants' implicit associations between space and valence—unbeknownst to the participants—but did not change the explicit mappings between space and valence available in their cultures.

It should be no surprise that participants in the Bob task are unaware of the implicit space–valence associations that guided their judgments. Until recently, psychologists were unaware of these implicit associations as well. According to Barbara Tversky (2001), an expert on the spatial mapping of abstract concepts, "despite the fact that most people are right-handed and terms like dexterity derived from 'right' in many languages have positive connotations and terms like sinister derived from 'left' have negative connotations, the horizontal axis in graphic displays seems to be [affectively] neutral" (p. 101). Some links between right–left space and positive and negative evaluation were documented (e.g., the preference for stockings hung on the right of a clothes hanger, Wilson & Nisbett, 1978), but such effects were unpredicted and were tentatively explained post-hoc in terms of temporal order, not spatial position.

To summarize this point, a task that requires *explicit judgments* can reveal *implicit associations*, based on motor experience, which most participants are unable to recognize or explain even when asked about them directly. Although the Bob task was the first tool used to demonstrate "body-specific" implicit associations between valence and left–right space (Casasanto, 2009), this explicit diagram task was followed by numerous tasks that required no explicit spatialization of "good" and "bad," including reaction time tasks (e.g., De la Vega et al., 2012; Kong, 2013), memory tasks (Brunyé et al., 2012), visual hemifield tasks (Brookshire & Casasanto, 2011), and studies of spontaneous gestures (Casasanto & Jasmin, 2010). By contrast with these tasks, the Bob task is exceptionally portable and is brief and simple enough to use with diverse populations. Tasks in which participants process space implicitly (e.g., Brookshire & Casasanto, 2011; De la Vega et al., 2012; Kong, 2013) or process valence implicitly (e.g., Brunyé et al., 2012) reveal a

similar pattern of implicit space–valence associations as revealed by the Bob task in American and European participants. In principle, the same should be true for Moroccan participants, although this conjecture remains to be tested.

To conclude, the implicit association between left–right space and valence is body specific, and we find no evidence that it is influenced by culture. Results in Spaniards corroborate those from other European and American samples, showing that left-handers implicitly associate "good" with "left" more than right-handers do, in spite of their exposure to explicit conventions in language and culture that link "good" with "right." We tested Moroccan Arabs to find out whether exposure to more stringent taboos against the left can influence implicit space–valence associations. The pattern of good-is-right responses in right-handed Moroccans did not differ from the pattern in right-handed Spaniards. This lack of difference cannot be attributed to a ceiling effect or to a lack of statistical power, and suggests that the *implicit* good-is-right mapping in Moroccan participants' minds is similar to the mapping in Spaniards,' even though the *explicit* good-is-right mapping appears to be stronger in Arab culture than in Spanish culture.

A definitive answer to the question of whether people immersed in an Arab culture are resistant to the implicit body-based good-is-left mapping found in European and American left-handers must await recruitment of a sufficient number of Arab left-handers: a practical challenge, given that less than 1% of our Moroccan participants appeared to be left-handed (0% of the participants who were given an implicit test of hand dominance). Together, these findings point to the importance of deepening the study of the interplay of bodily and cultural experiences, and their effects on the construction of a meaningful world and our behavior in it.

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Note

1. All reported Fisher's exact tests were two tailed.

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