Cogn Process (2012) 13 (Suppl 1):S79–S82
DOI 10.1007/s10339-012-0472-x

SHORT REPORT

Nodding in dis/agreement: a tale of two cultures

Elena Andonova · Holly A. Taylor

Abstract Head movement is commonly used to communicate positive versus negative response. However, whereas in US culture, vertical head movement denotes positivity (nodding to say "yes") and horizontal head movement is associated with negativity (shaking heads to say "no"), in Bulgaria, this response pattern is reversed, that is, horizontal head movement means "yes" and vertical head movement means "no." Thus, these two cultures spatially "embody" agreement via different movement directions. We examined the effect of such cultural differences on cognitive processing that has no communicative intent by comparing ratings of likeability, brightness, and positive feeling associated with different color moving dots. Participants followed the dots' movement with their heads in a 2 (direction: vertical vs. horizontal) by 2 (speed: fast vs. slow) design. We found a two-way country by speed of movement interaction such that Bulgarian participants associated colors with more positive feeling when those were perceived in combination with slower head movement irrespective of movement direction. US participants, on the other hand, rated color dots as better mood-enhancing in combination with faster head movement. There was a similar two-way country by movement speed interaction for likeability ratings but none for brightness. Findings are discussed in terms of variability in gestural meaning and culture-specific embodiment patterns.

E. Andonova (✉)
Department of Cognitive Science and Psychology,
New Bulgarian University, 21, Montevideo Street,
1618 Sofia, Bulgaria
e-mail: eandonova@nbu.bg

H. A. Taylor
Department of Psychology, Tufts University,
Psychology Building, Room 315, Medford, MA 02155, USA

Keywords Cross-cultural · Embodiment · Non-verbal communication · Head movement

Introduction

Many cultures use head movement to non-verbally express agreement and disagreement. Typically, vertical movement (nodding) is associated with a positive response and horizontal movement (shaking head) with a negative response. These associations are so common that one may be tempted to regard them as universal and natural, a grounding of cultural practice in more or less universal physical experience. Reasonable motivation for this particular grounding of acceptance and refusal in body movements, and in particular the human head, can be found going back to Darwin's (1872) book on the expression of emotion in man and animals. Here, he suggested how the association of head movement with intended meaning may have originated in early infant communicative behavior:

> With infants, the first act of denial consists in refusing food; and I repeatedly noticed with my own infants, that they did so by withdrawing their heads laterally from the breast, or from anything offered them in a spoon. In accepting food and taking it into their mouths, they incline their heads forwards.

Indeed, head nodding and shaking, together with pointing, are among the most common early communicative acquisitions. Bates et al. (1975) include nodding to say *yes* and head-shaking to say *no* in the category of early conventional gestures, on a par with waving a hand to say *good-bye*. Guidetti (2005) found that for 16-month-old children, gestures served as the only means of expressing

agreement and refusal, and that the most frequently expressed function was assertion rather than negation.

Given their early age of acquisition and their prevalence in habitual communication, it is reasonable to ask whether such enduring physically embodied habits might affect cognitive processing beyond communicative interaction. Wells and Petty (1980) found effects of head movement on persuasion. Participants performing vertical head movements agreed with the editorial comments they heard more than those performing horizontal head movements; this effect held for counter-attitudinal (student tuition fees should be raised) and pro-attitudinal (student tuition fees should be lowered) comments. Similarly, Förster and Strack (1996) found that vertical and horizontal head movements enhanced recognition of positively and negatively valenced adjectives, respectively.

Although agreeing and refusing (for example, food) can be expressed gesturally by nodding and head-shaking, these are not the only non-verbal means of doing so. In the French culture, for example, approximately ten gestural expressions of refusal have been studied, including shaking one's finger and placing one's hand forward with the palm facing the addressee (Calbris and Montredon 1986). Furthermore, while nodding agreement is a widespread cultural practice, including in the United States and most of Europe, it is not a universal. Even when head movement is used to say *yes* and *no*, the directionality of doing so does not cut across all cultures. A case in counterpoint is the Bulgarian cultural tradition where agreeing with one's interlocutor or giving a *yes* answer is expressed and/or accompanied habitually by a lateral head movement, and rejection or saying *no* is associated with a vertical head movement. In addition, head movement speed appears to affect gestural interpretation with slower speed indicating agreement more than faster movement.

Most importantly, if higher-level cognitive processing is grounded in habitual body action, including head movement, we would expect cross-cultural differences between cultures that "embody" consent and dissent in opposing fashion. The present cross-cultural study was designed to examine this hypothesis by comparing US and Bulgarian experimental participants' mood-related, likeability, and brightness ratings of different colors after performing head movements. We predicted effects of movement direction for likeability and mood-related ratings. Brightness ratings, in contrast do not have an obvious valence, and as such served as control questions.

Methods

The study employed two within-participant independent variables, movement direction (vertical vs. horizontal) and movement speed (fast vs. slow), and one between-participant variable, culture and country of residence (US vs. Bulgarian). The dependent measures were participants' ratings on three scales: how the color makes me feel ("positive feeling"), how much I like the color ("likeability"), and how bright the color ("brightness") is.

Participants

Twenty-two native speakers of American English (7 male) participated in the study in Boston, US, and twenty-one native speakers of Bulgarian (6 male) participated in Sofia, Bulgaria.

Materials

We presented participants with seven basic colors (blue, green, orange, yellow, red, purple, and brown), in four shades each, for a total of 28 different color dots on a wide projection screen. The dots' movement on the screen was either vertical or horizontal and either slow or fast. There were four cycles of movement on each trial. Each participant saw one of four orders of presentation of the 28 color dots such that each of the dots appeared only once in one of the four within-participant conditions (vertical and slow movement, vertical and fast movement, horizontal and slow movement, and horizontal and fast movement) per order. The association of the color dots with the four conditions was counterbalanced across the four orders.

Procedure

Participants were told that they were taking part in a study examining the effects of head motion on color perception. They were tested individually in front of a projection screen at a distance of approximately 4–6 feet and asked to follow the movement of the dot on the screen by moving their head along and not only their gaze. Practice trials with colors not included in the study materials made sure that participants understood the task and were following the instructions on head movement. The color dots were shown moving on the screen one at a time for a total of 28 experimental trials. When each dot stopped moving, participants rated the specific color on three scales: (a) how does this color make you feel, (b) how bright is this color, (c) how much do you like this color. The ratings were on a scale from 1 (unwell, not bright, and not likeable at all) to 7 (very well, very bright, and very likeable). At the end of testing, participants were debriefed about the purposes of the experiment.

Table 1 Mean ratings for positive feeling, likeability, and brightness of Bulgarian and US participants in horizontal and vertical head movement conditions at fast and slow speed of movement

		Positive feeling ratings		Likeability ratings		Brightness ratings	
		Bulgaria	US	Bulgaria	US	Bulgaria	US
Vertical movement	Slow	4.26	3.67	4.33	3.74	3.83	3.33
	Fast	4.66	4.21	4.17	4.22	4.56	4.10
Horizontal movement	Slow	4.56	3.89	4.25	3.90	4.13	3.71
	Fast	4.09	3.77	3.85	3.86	4.07	3.85

Results

The mean values of ratings for all three dependent measures in the four within-participant conditions for each country are presented in Table 1.

A mixed factor ANOVA (Movement direction: Up-down vs. Left–right by Movement speed: Fast vs. Slow by Country: Bulgaria vs. USA) examined ratings in response to the question "How does this color make me feel?" (Fig. 1). There was a main effect of country: on average, Bulgarian speakers gave higher overall ratings ($M = 4.39$) than American participants ($M = 3.89$). Contrary to expectations, we found no two-way interaction between country and direction ($p > 0.9$). In line with our expectations, however, we found that speed mattered in a two-way interaction between country and speed of movement ($F = 6.32$, $p = 0.016$). In addition, the three-way country by direction by speed interaction was marginally significant ($F = 3.93$, $p = 0.054$). We discuss these results in the next section.

A mixed factor ANOVA analyzed responses to "How much do I like this color?" (Movement direction: Up-down vs. Left–right by Movement speed: Fast vs. Slow by Country: Bulgaria vs. USA). We found no overall difference in average rating across country but a two-way interaction between country and speed revealing that Bulgarian participants gave more positive responses to this question when the color dots and participants' heads were moving at a slower speed ($M = 4.29$) than at faster speed ($M = 4.01$), whereas speed did not affect American participants' ratings ($M = 3.82$ and $M = 4.04$ for slow and fast speed, respectively).

Finally, a mixed factor ANOVA (Movement direction: Up-down vs. Left–right by Movement speed: Fast vs. Slow by Country: Bulgaria vs. USA) on participants' responses to the question "How bright is this color?" revealed a main effect of country ($M = 4.15$ for Bulgarians and $M = 3.75$ for US participants) but no interactions between country and movement speed or direction.

Discussion

The results of this experiment revealed a cross-cultural difference in how head movement affected participants' perception of colors in terms of their likeability and mood-enhancing qualities. US participants reported colors making them feel better after they moved their head vertically when movement speed was fast. This result is in line with previous findings in the literature on head movement affecting attitudinal tasks such as Wells and Petty (1980) and Förster and Strack (1996) with population samples sharing similar cultural traditions. The Bulgarian participants, however, did not report similar mood enhancement after vertical head movement. We interpret this finding as an effect of culture on the patterns of embodiment in cognitive processing.

Contrary to expectations, we found no interaction between country and direction but we did find a two-way interaction between country and speed of movement.

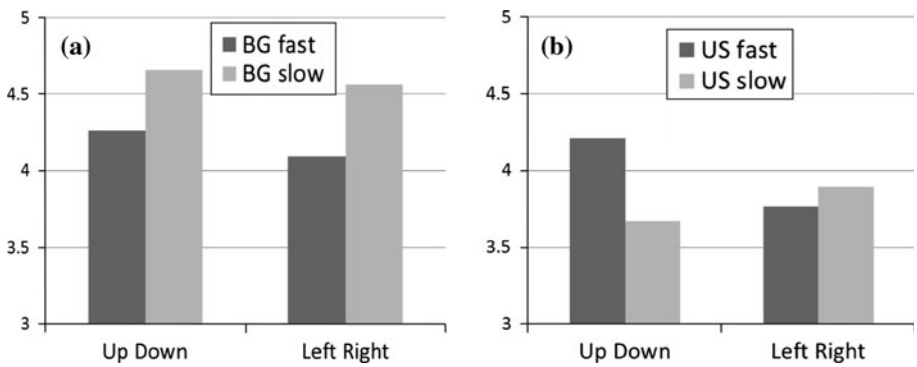

Fig. 1 Mean values of positive feeling ratings as a function of movement direction (vertical: *up*/*down*, horizontal: *left*/*right*) and movement speed (fast vs. slow) for **a** Bulgarian participants, and **b** US participants

Slower speed of head movement produced higher positive feeling ratings in Bulgarian participants and lower ratings in US participants. It was our expectation that speed of movement would be a more salient and reliable cue in the Bulgarian culture, and this was supported by the data. However, Bulgarian participants not reporting mood enhancement after horizontal head movement was surprising given that the habitual use of head gestures in Bulgaria is a lateral movement to mean *yes*. A possible explanation may be that Bulgarians have more exposure to the alternate convention (nodding to mean *yes*) through foreign culture media, whereas US participants are less likely to have familiarity with cultures expressing positive responses by a lateral head movement. Future research needs to explore this and other possible reasons for the absent movement direction effect in Bulgarian participants.

Finally, in line with our predictions, participants differed across cultures only along attitudinal response dimensions but not on ratings of color brightness speaking in favor of culturally specific emotive and higher-level cognitive biases, while lower level perceptual processes appeared to remain immune to such differences.

How can these cross-cultural differences be reconciled with the notion of embodying abstract symbols in universal human physical experience such as bodily action? It appears that embodiment is also affected by habitual bodily actions specific to certain cultures. Our study implicates parameters such as speed and direction of movement in informing such variation. In particular, the speed of performing head gestures might also be indicative of a stronger or weaker expression or response. For example, nodding vigorously may indicate stronger or more confident agreement in US culture, whereas slower head movement is associated with more positive (less rejection) responses in Bulgarian culture. While ours is a pioneering study in this direction, it is clear that future research needs to address such issues in more depth and detail.

Conclusion

In this study, we set out to explore the cross-cultural validity of findings on head movement effects on cognitive processing by comparing how the direction and speed of movement affected the ratings of mood, likeability, and brightness of colors by participants belonging to two different cultures, the US and Bulgaria. The critical cross-cultural difference here is the variation in the habitual use of head movement (nodding vs. shaking head) to express assertion vs. negation. Our findings provide support for the impact of culture on a relatively neutral and simple cognitive attitudinal task when accompanied with culture-specific head gestures. It is certainly not the case that vertical head movement affects higher cognitive processing universally. Embodiment of meaning appears to be culture-specific. Cognition is clearly experiential in both the "bodied" physical action sense and in the cultural sense of habitual action-meaning coupling grounded in cultural practice. The findings of this cross-cultural experiment are of interest and relevance to advancing our understanding of this complex relationship and point to the need to address a number of issues adding a novel culture specificity hypothesis of embodiment to the body specificity hypothesis expressed by Casasanto (2009).

Acknowledgments We would like to thank our students and acknowledge gratefully support for our cooperation through a *Tufts Innovates* (Tufts University) grant.

Conflict of interest This supplement was not sponsored by outside commercial interests. It was funded entirely by ECONA, Via dei Marsi, 78, 00185 Roma, Italy.

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