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Reading direction and culture

Shihui Han and Georg Northoff

As we discussed in our recent article (Culture-sensitive neural substrates of human cognition: a transcultural neuroimaging approach. *Nature Rev. Neurosci.* **9**, 646–654 (2008))[1], neural activities of the human brain, in association with specific cognitive functions, are modulated by social experience and sociocultural contexts. This is not surprising given that neural plasticity has been well documented and acknowledged by neuroscientists. Reading constitutes a major part of human visual experience and thus generates a strong influence on cognitive processes involved in visuospatial tasks, as summarized by Kazandjian and Chokron (Paying attention to reading direction. *Nature Rev. Neurosci.* 20 Nov 2008 (doi:10.1038/nrn2456-c1))[2]. Noting that people from different cultures differ in the direction in which they read (either left-to-right or right-to-left), Kazandjian and Chokron asked further to what degree reading direction modulates the neuroanatomical substrates that underlie the visual skills that are associated with reading.

A broad sense of culture is "the shared way of life of a group of people" (REF. 3), and thus culture should cover reading habits such as reading direction too. What kind of cognitive function might be affected by reading direction? Spatial representation and spatial attention may be prime candidates, particularly when these cognitive processes operate along the horizontal meridian of the visual field. More specifically, a left-to-right reading direction may bias attention towards the left visual field, whereas a right-to-left reading direction may facilitate attention towards the right visual field. If this effect were neurally relevant, one might now expect stronger neural activity associated with reading in the respective side, be it right or left. Moreover, it would be interesting to investigate how reading direction interacts with other aspects of culture in modulating the functional organization of the human brain. This could be done by comparing two cultural groups with the same reading direction or two cultural groups with different reading directions. However, it may be difficult to disentangle this effect from others, because reading direction may be confounded with other aspects of culture. For instance, people who are different in other aspects of culture but who have the same reading direction show distinct neural mechanisms associated with perceptual and attentional processing[4,5].

Another interesting issue is whether reading direction may influence neurocognitive processes of high-level cognitive functions that in most cases depend on social interactions rather than reading direction. Previous studies suggest that cultural influences on human cognition may result in specific cognitive styles. For example, people from Western cultures (such as European Americans) are characterized by an analytic cognitive style that is attuned to salient focal objects but less sensitive to contexts, whereas people engaged in East Asian cultures (for example, Chinese, Japanese and Korean people) possess a more holistic cognitive style that is attuned to background and contextual information[6,7]. Such different cognitive styles may extend to social cognitions and so result in culture-specific self concepts and a culture-specific neural representation of the self[8,9]. What does this imply for the possible impact of the reading direction? Reading direction might not affect high-level social cognitions by itself. However, if reading direction is involved in shaping cognitive or thinking styles, it may then contribute to the cultural dependence of culture-specific social cognitive processes.

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doi:10.1038/nrn2456-c2

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