



Finger counting and numerical cognition

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Following a recent surge of interest in finger-based number knowledge, we invited empirical and conceptual contributions to assess the feasibility of a Research Topic on this issue. We received a considerable number of submissions, many of which were further improved by constructive and interactive peer-review and ultimately appeared as part of the Research Topic “Handy numbers: Finger counting and numerical cognition.” We wish to thank all authors and reviewers, as well as the publisher’s support team around Meghan Hodge, for their excellent work.

This enthusiastic response from the research community confirmed our expectation that the time is ripe to consider the domain of number knowledge from the theoretical perspective of embodied cognition. This domain is particularly challenging for an embodied perspective on human cognition because mental arithmetic was thought to consist of abstract and amodal symbol manipulation. By disregarding the acquisition, implementation, or retrieval context of such knowledge, numerical cognition provided an ideal example of abstract information processing (e.g., Groen and Parkman, 1972). Yet in recent years a flurry of reports documented just such sensory and motor contributions to numerical cognition, and the contributions gathered for the present research topic on “handy numbers” provide an up-to-date survey of this development.

The published contributions make clear that there is no agreement about the relevance of finger counting for numerical cognition. For example, finger associations might not be a necessary component of number knowledge acquisition (Crollen et al., 2011),

they might merely reflect immature retrieval strategies (Kaufmann et al., 2011), and some aspects of finger-based number representation might actually hinder the initial learning process (Beller and Bender, 2011). Nevertheless, all empirical contributions to this research topic support a role of fingers in numerical cognition: Spatial–numerical associations, previously attributed to reading habits, may at least partly have their origin in finger counting routines (Fischer and Brugger, 2011; Riello and Rusconi, 2011). They are prevalent in finger counting systems of many cultures (Previtali et al., 2011; Domahs et al., 2012), affect a wide range of behaviors (Fischer and Brugger, 2011), depend on hand orientation (Previtali et al., 2011), and possibly on finger gnosia (Costa et al., 2011; Reeve and Humberstone, 2011). Furthermore, finger usage and finger-based number representations may vary considerably according to cultural influences (Bender and Beller, 2011; Domahs et al., 2012). Mental addition is selectively impaired by passive hand movements (Imbo et al., 2011) and shows sub-base five effects that can be attributed to hand-based representations (Klein et al., 2011). Addition also activates finger-related cortical structures (Krinzinger et al., 2011).

Findings such as these highlight the special status of finger representations in numerical cognition (Di Luca and Pesenti, 2011) and require a conceptual rethinking. This can begin by aligning educational and neuroscientific perspectives (Moeller et al., 2011) or by contextualizing them within the embodied cognition framework (Fischer and Brugger, 2011).

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