The role of horizontal, vertical and sagittal axes on visuo–spatial number mapping in children

Sarah Cooney [0000-0002-0165-3543], Corinne Holmes and Fiona Newell

Trinity College Dublin, Dublin, Ireland, cooneys4@tcd.ie

Abstract. Accurate number line representations reliably predict children's future arithmetic performance. There is substantial evidence linking numerical magnitude to the physical properties of extracorporeal space. The most influential support for this connection comes from the SNARC effect (Spatial Numerical Association of Response Codes), where responses to small/large numbers are faster on the left/right side of space, respectively, thus demonstrating horizontal mapping of numerical magnitude. Much less is known about how numbers are represented on the vertical and sagittal axes and if spatial numerical associations on multiple axes exist in childhood. In a 2AFC within-subject's paradigm, two groups of children, aged 5-7 and 8-9 years, performed a single digit magnitude comparison task with response buttons positioned up/down (vertical), left/right (horizontal) and near/far (sagittal). Our results provide evidence of spatial numerical associations on all three axes, the strength of this mapping varies depending on the relative contribution of spatio-anatomical and extracorporeal information. These findings have important implications for the role of development in spatial and numerical cognition.

Keywords: Numerical Cognition, Embodied Cognition, Development