How children and adults use metaphor to reason about time, number, emotion, and music

Sarah Duffy[1], Jeannette Littlemore[2], Sarah Turner[3], Bodo Winter[2] & Greg Woodin[2]
[1]Northumbria University, sarah.duffy@northumbria.ac.uk [2] University of Birmingham, j.m.littlemore@bham.ac.uk, b.winter@bham.ac.uk, gawoodin@gmail.com[3] Coventry University, sarah.turner@coventry.ac.uk

Keywords: metaphor, abstract concepts, language learning, cognition

Metaphor has been shown to play a key role in how adults reason about time, number, emotion, and music. However, less is known about how children employ metaphor when reasoning about these concepts. Research into children's use of metaphor to reason about time and number has taken a primarily quantitative approach (e.g., Lourenco and Longo, 2010), and there have been no studies of how children use metaphor to reason about emotions or music. To gain a deeper understanding of the development of these abstract concepts, we conducted a qualitative and quantitative investigation into the ways in which children aged 5–8 (N = 99) and adults (N = 69) in England employ metaphor to reason about time, number, emotion, and music.

For time, number, emotion, and pitch, we followed a procedure similar to Tversky et al. (1991) in that we asked participants to place stickers depicting different life stages (Task 1), different numbers (Task 2), different emotions (Task 3), and different musical notes (Task 4) on a piece of paper to show how they thought the different prompts related to one another. To explore the metaphors that the participants used to reason about two other musical features (articulation and tonality), we asked them to draw pictorial representations illustrating the differences between staccato and legato sequences of notes (articulation) (Task 5), and major and minor chords (tonality) (Task 6). We conducted qualitative analyses to identify whether metaphorical mappings were depicted in these drawings. For each of the six tasks, we interviewed participants about the reasons for their choices, leading to the creation of a 170,000-word corpus.

Our findings indicate that there are substantial differences between how children and adults use metaphor to represent time, number, emotion, and music, and in the explanations that they provide when doing so. On both the number task and the time task, the children demonstrated a strong preference for the horizontal axis when depicting numbers of increasing magnitude, whereas the adults were more evenly split between horizontal and vertical responses. In the domain of emotion, both children and adults used the horizontal axis to depict increasingly positive emotions. In the pitch task, the children were less likely than the adults to position the stickers vertically to reflect differences in pitch. Our analysis of the interview data revealed that, across the different tasks, the children had a stronger tendency than the adults to produce cross-sensory metaphors, personify the stimuli, relate tasks to their own lived experiences, and motivate their responses using narratives. By contrast, adults produced more schematic representations. Qualitative differences were observed in the ways in which children and adults referred to visual patterns, cultural phenomena, iconicity, and emotions. Responses varied according to the age of the children and the task type. These findings provide new insight into how children use metaphor and other, related mechanisms to reason about abstract concepts, how this reasoning differs from that of adults, and how it develops over the first three years of formal education in England.

References

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