The first frames: schematic integrations, image schemas, and spatial primitives

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We propose three kinds of cognitive structure that have not been differentiated in the psychological and cognitive linguistic literatures. They are spatial primitives, image schemas, and schematic integrations. Spatial primitives are the first conceptual building blocks formed in infancy (Mandler 1992), image schemas are simple spatial stories built from them (Johnson 1987, Lakoff 1987, Mandler 2010), and schematic integrations use the first two types to build concepts that include non-spatial elements, such as force and emotion (Mandler and Pagán Cánovas). These different kinds of structure have all come under the umbrella term of 'image schemas.' However, they differ in their content, developmental origin, imageability, and role in meaning construction.

Building on the spatial primitives, the ability to create image schemas enables infants to run mental simulations of spatial events. Then the ability to connect disparate experiences with these simulations and integrate them into new wholes (Fauconnier and Turner 2002) produces the first schematic integrations, which gradually incorporate more and more non-spatial elements. Non-spatial elements still cannot be imaged, even for adults; one can think about a car crash and even shudder while doing it, but the simulation will show the break-up of the car, not the force that causes it. However, schematic integrations allow the infant, for the first time, to conceptualize non-spatial experiences as meaningful aspects of organized spatial stories.

Piaget's pioneering research provided the foundations for the field (e.g. Piaget 1951), but it resulted in a view of infants as mainly sensorimotor creatures, capable of little or no conceptualization prior to language. Recent work on early cognitive development has been consistently showing that a rich system of conceptual structures and cognitive habits is already in place before verbal activity begins (Mandler 2004). Language and culture necessarily build on this system. They boost it and change it, sometimes in dramatic ways, but they are also influenced by it. Research on image schemas often ignores the particularities of this diachrony. However, what comes earlier or later, what belongs to the stage of primitives, image schemas, or schematic integrations, can be of great importance for the analysis of later meaning construction. If we are to understand embodiment and metaphor in language and thought, we will need to see them as part of a developmental story.

Image schemas, rather than non-spatial concepts requiring schematic integrations, may be the primary source of spatial metaphors in language. Understanding in the early years will almost always involve spatial simulation of events. This raises the interesting question as to whether the majority of metaphors are structured by spatial image schemas rather than non-spatial materials, such as force or intensity, which themselves require schematic integrations with spatially described events to be understood. It also implies asking to what extent the image schematic structures in figurative language reflect early cognitive habits.

For example, infants pay little attention to the size and boundaries of containers, and mainly focus on objects going in or out of containers (Hespos and Baillargeon 2001a-b, Dewell 2005). In language, containment in emotion metaphors focuses on relative

location and on entering/exiting containers (e.g. "there is a lot of anger in him", "I don't know what got into me"). On the other hand, size relations and boundaries can easily be ignored (e.g. "Spain is always in my heart", "Love is in the air"). This seems to indicate that the container schema keeps some of its developmentally early features in adult life, and that our earliest conceptualizations of containment experiences are more relevant for metaphor formation than abstract generalizations such as 'bounded region in space'.

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