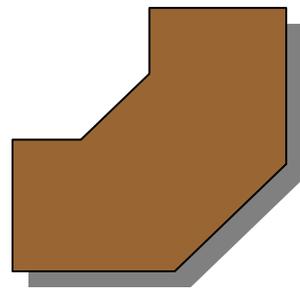


Levels in the Developmental Progression for the Composition of Shapes



Precomposer - Children manipulate shapes as individuals, but are unable to combine them to compose a larger shape. For example, children might use a single shape for a sun, a separate shape for a tree, and another separate shape for a person. Children cannot accurately match shapes to simple frames (closed figures that can be filled with a single shape.)

Piece Assembler – Children at this level are similar to Precomposers, but they place shapes contiguously to form pictures. In free form “make a picture” tasks, for example, each shape used represents a unique role, or function in the picture (e.g. one shape for one leg). Children can fill simple frames using trial and error (Mansfield & Scott, 1990; Sales, 1994), but have limited ability to use turns or flips to do so; they cannot use motions to see shapes from different perspectives (Sarama et al., 1996). Thus, children at the first two levels view shapes only as wholes and see few geometric relationships between shapes or between parts of shapes (i.e. a property of the shape).

Picture Maker - Children can concatenate shapes contiguously to form pictures in which several shapes play a single role (e.g. a leg might be created from three contiguous squares, but use trial and error and do not anticipate creation of new geometric shapes. Shapes are chosen using gestalt configuration or one component such as side lengths (Sarama et al, 1996)

Shape Composer – Children combine shapes to make new shapes or fill puzzles, with growing intentionality and anticipation (“I know what will fit”). Shapes are chosen using angles as well as side lengths. Eventually, the child considers several alternative shapes with angles equal to the existing arrangement. Rotations and flipping are used intentionally (and mentally, i.e. with anticipation) to select and place shapes (Sarama et al, 1996). They can fill complex frames (figures whose filling requires multiple shapes; Sales, 1994) or cover regions (Mansfield & Scott, 1990). Imagery and systematicity grow within this and the following levels. In summary, there is intentionality and anticipation, based on the shapes’ attributes, and thus, the child has imagery of the component shapes, although imagery of the composite shape develops within this level (and throughout the following levels).

Substitution Composer – Children deliberately form composite units of shapes (Clements, 1997) and recognize and use substitution relations among these shapes (two trapezoid pattern blocks can make a hexagon).

Shape Composite Iterater – Children construct and operate on composite units (units of units) intentionally. They can continue a pattern of shapes that leads to a “good covering,” but without coordinating units of units (Clements et al, 1997)

Shape Composer with Superordinate Units – Children build and apply (iterate and otherwise operate) on units of units.

Clements, D., Wilson, D. & Sarama, J. (2004) Young Children’s Composition of Geometric Figures: A Learning Trajectory. *Mathematical Thinking and Learning*. 6 (2), 163-184.