The Overcoming of Functional Fixedness as Applied to Visual Arts Education

Karen A. Keller

University of Massachusetts Dartmouth

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Abstract

Functional fixedness can be defined as a cognitive bias which causes one to perceive objects as only being able to serve the purpose for which they are designed (American Psychological Association, 2018; Smith, Paradice, & Smith, 2000; Ness 2015; & Munoz-Rubke, Olson, Will, & James, 2018). This paper contains an in-depth overview of research regarding functional fixedness and the overcoming of functional fixedness as it relates to high school art education. First, a working definition of functional fixedness will be discussed, followed by outline techniques to overcome it, and provide examples of *functional flexibility* (the ability to overcome functional fixedness) in various problem solving situations. Then, an overview of functionally flexible contemporary artists and potential applications of teaching *functional flexibility* in the art classroom, will be discussed in relation to the psychological research about functional fixedness.

Keywords: Functional Fixedness, Creative Process, Art Education, Problem-Solving

The Overcoming of Functional Fixedness through Visual Arts Education

As first defined by Karl Duncker (Duncker & Dashiell, 1945), the term *functional fixedness* refers to a cognitive bias which causes one to perceive objects as only being able to serve the purpose for which they are designed (American Psychological Association, 2018; Smith, Paradice, & Smith, 2000; Ness 2015; & Munoz-Rubke, Olson, Will, & James, 2018). For instance, a person might see a pencil and only view it as a writing and drawing utensil and not as a building material, carving tool, or straightedge. This bias limits creative thinking because it allows the person to use an object for only one or two express purposes, while in fact that object could aid in problem-solving in a variety of contexts. There are several methods to better access *functional flexibility* in everyday creative practice by breaking *frames* of reference. Ness (2015) states that "recognizing frames, the consequences of thinking within frames, [and] processes for breaking frames are the central concepts" (p. 115) to accessing this blocked creative potential.

Functional flexibility[1] can therefore be an asset to the visual artist, who uses methods and materials of all kinds to create meaningful works of sculpture, film, painting, installation and mixed media. Just as creative problem solving techniques, including those for *functional flexibility*, are taught in Science Technology Engineering Math (STEM) and corporate settings (Smith, Paradice, & Smith, 2000), so, too, can they be an important aspect of art education.

Steps to Overcome Functional Fixedness

The first step in overcoming a cognitive bias like functional fixedness is to recognize and understand the problem (Smith, Paradice, & Smith, 2000). Our minds are designed to streamline cognitive activities by using mental *frames* (Ness, 2015) of reference from past experiences with similar items. If a person has always used a tennis racquet to play tennis, they will be limited to that view what a tennis racquet can do or be. Although it can be helpful to quickly identify the

names and proper uses for items from past experience, the inability to see them outside the familiar frame of reference limits one's ability to use the object in a new way. If a person knows how an object is supposed to function "it becomes more difficult to create other uses for it" (McCaffrey, 2018, p. 24). Therefore, if the individual can identify that they are seeing the object through this limiting frame of past experience, they can consciously separate the object from its name, context, and familiar uses to redefine the *mystery* object with novel uses. The object formerly known as a *tennis racquet* can become a weaving device or a strainer. Lowenfeld (1975) demonstrates that breaking out of frames can apply to any fixation which blocks creativity, even in young children (pg. 13).

Once a person has unveiled the object from the restrictive mental frame of preconception, they can then deconstruct, rearrange or recombine it with other materials (Ness, 2015). For instance, learning exercises like "take-aparts" allow children to gain a greater understanding of the mechanisms of everyday items like toys through deconstruction (Exploratorium, 2018). This method is also a way to spark *functional flexibility* because although the items may initially seem like inalterable products, the tinkerer would come to learn the useful components which make up each item, and subsequently know to use those separately or rearranged. Beyond this, one could take multiple objects and combine them in novel ways to form a new tool or creation through recombination. This separation of individual components as a means of breaking functionally fixed frames is called the "generic parts technique" (McCaffrey, 2018, pg. 24).

Example Problems Solved by Overcoming Functional Fixedness

Two common exercises which illustrate both functional fixedness and *functional flexibility* at work are the Two Strings Experiment and the Candle Experiment. In the Two

Strings Experiment (Kolber & Margol, 2014) participants are given a chair and a paint can, and must attach a five-foot rope to a four-foot rope. The ropes each hang from the ceiling too far apart to grab both from the floor or on a chair. The participants, after trying in vain on their own, were eventually given the hint to use "the paint can as a pendulum" (Kolber& Margol, 2014, 1:54). This required the participants to break their frame of reference regarding the paint can. Though they initially saw it as a *can made for holding paint* with help, they broke that frame and saw the paint can as an attachable object with weight.

A second example of an exercise requiring *functional flexibility* is the Candle Experiment, participants are instructed to "Take a candle, a book of matches, and a box of thumbtacks, and attach the candle to a wall" (McCaffrey, 2018; Ness, 2015; Duncker & Dashiell, 1945) Although most participants cannot solve the problem with these instructions, if they are told to "take a candle, a book of matches, a box, and some thumbtacks" (Ness, 2015) the task of attaching the candle to the wall is more likely to be accomplished. Participants, seeing the box of thumbtacks as generic parts, tack the now empty box to the wall to make a candle holder. Both of these puzzles (along with the anecdote in *The Art All-State Installation Challenge on page 7*) provide a real-world application and understanding of functional fixedness for its participants, and allows them to see new solutions through *functional flexibility*.

Artists Who Access *Functional Flexibility* to Create Innovative Works

A considerable number of artists have overcome functional fixedness with various tools and materials to make creative works of art. Contemporary art practice includes a variety of new functionally flexible approaches; Nicholas Gentry is a mixed media painter who artist who incorporates floppy disks and old film strips into his works (Gentry, 2019). Mosaics made from colorful plastic children's toys by artist Jane Perkins (Perkins, 2015), sculptures made of repurposed metal trash by Michelle Reader (Reader, 2018), and installations made from recycled items by Lisa Hoke (Hoke, 2019) are also strong examples of *functionally flexible* artworks. Lisa Hoke has used the repurposed consumer packaging in her installations as a key part of her works' commentary on modern material culture in her "Attention Shoppers" series. Artists like Gentry, Perkins, Reader and Hoke have become open to the possibilities of using non-art materials in a novel artistic way by separating the objects from their contextual frames. These artists prove that meaningful works of art can be created without traditional materials, and can even be contextually enhanced by their unique material makeup.

The Art All-State Installation Challenge

In 2015 I was fortunate enough to be a participant in the Massachusetts Art All-State (Massachusetts Art Education Association, 2018) held at UMass Dartmouth. This gathering of high school Junior artists provided an enlightening collaborative art-making experience. Our group of eighteen students from all over the state were given twenty-four hours to create an innovative installation artwork using only two recycled materials; binders and 3D glasses. At first we were stumped. We were given only two piles of seemingly useless materials along with scissors, tape, and string. What were we to do? Then, one of our artist mentors suggested we think about taking apart these materials. Thus, we turned binders into bunches of colorful plastic sheets, metal clips, and cardboard squares, while our 3D glasses became piles of shimmery cellophane and thin flexible sticks of plastic. This deconstruction opened our eyes to the functionally flexible *possibilities. Although we were not told what functional fixedness was or how we overcame it, we took a big step in learning how to use materials in unique ways to create works of art. In the end, we transformed our workspace into an underwater dreamscape using only piles of* junk *and some imagination.*

One artist who embodies this idea is Phil Hansen, who looks "at limitations as a source of creativity" (Hansen, 2013, 8:29). He looks for ways to challenge himself with self-imposed artistic limitations like using only lit candles or live worms to create impermanent, motion-based artworks. Hansen sought mateirals which were challenging to use artistically, and then solved the problem of using them to make new and interesting works of art. The challenges involving the unusual materials actually sparked the creative process for this artist.

Conclusion

The use of repurposed materials is nothing new to the visual arts and art education, as it is common in Reggio Emilia art education (Topal & Gandini, 1999; Topal & Gandini, 2019) to allow students to explore, play, and create using both recycled and organic repurposed items. However, this research on functional fixedness could provide further clarity and focus to this classroom practice by giving students a concrete definition for their own biases toward familiar objects, as well as the effective methods to work outside of said bias.

The amalgamation of this information, combined with the artistic and pedagogical experience of an art educator, could be the foundation for new unique art educational exercises. Going forward, this significant psychological information could be applied to lesson planning for the K-12 art classroom and artistic innovation beyond. For instance, art classes could include a lesson or unit on how to be functionally flexible using techniques like breaking frames and generic parts. This type of creative exercise could apply not just to the use of traditional art materials, but to found objects, recyclables, and other unique items, which could provide a new lens for the artmaking experience. Furthermore, this approach could make the world of studio art more interesting, personal, and even accessible to a variety of students because it allows students to connect to the materials through an alternative approach. By teaching the mechanisms of

functional fixedness and the tools to access *functional flexibility,* art educators could open students eyes to the infinite possible ways to create interesting and meaningful works of art with everyday objects, reimagined.

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Footnotes

[1] The shorthand *functional flexibility* will refer to the ability to overcome functional fixedness.