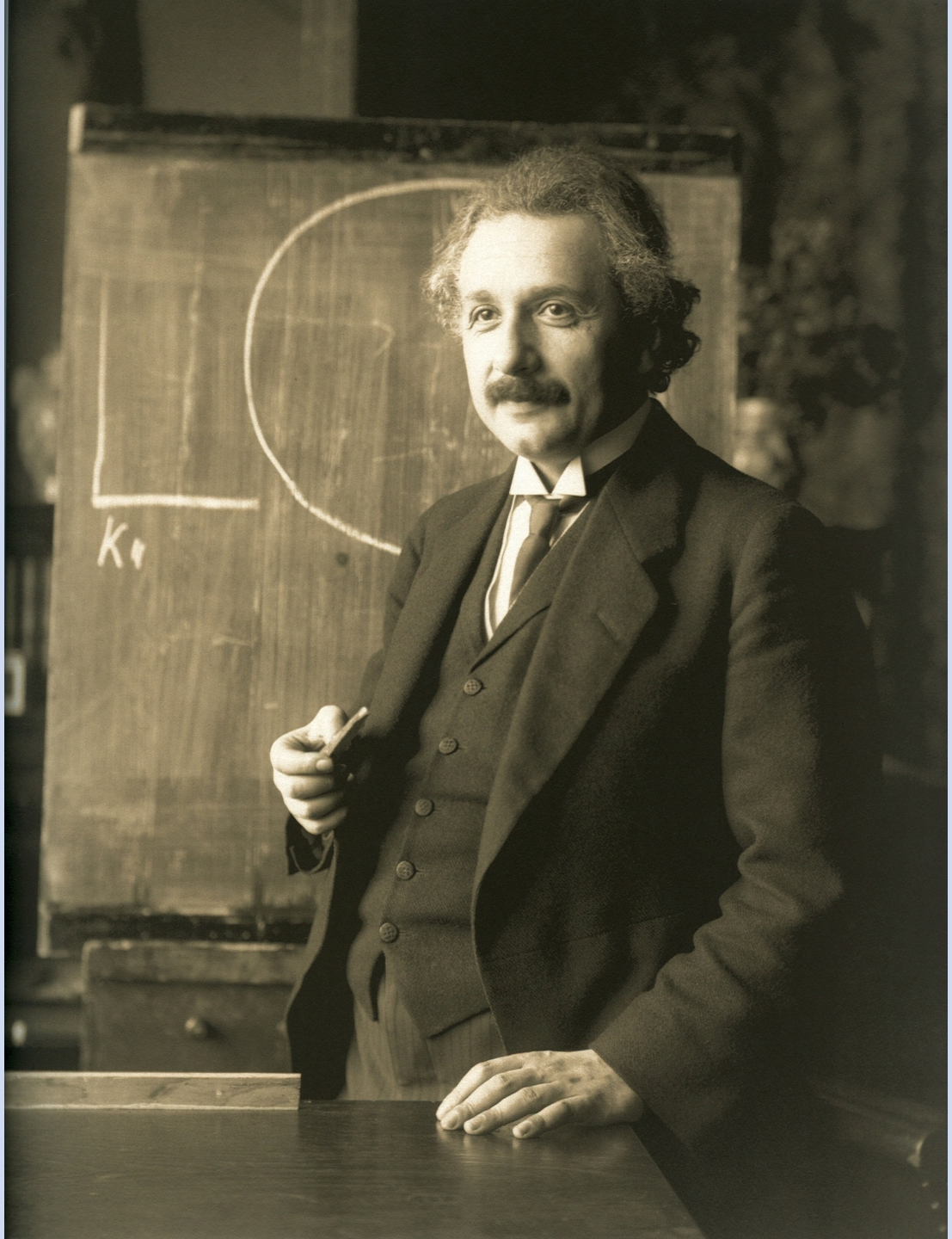
Creative Problem-Solving Exercise: Overcoming Functional Fixedness



“We cannot solve our problems with the same thinking we used when we created them."

-- Albert Einstein (1879-1955)

What is Creative Problem-Solving?

Ellis Paul Torrance, an early creativity researcher and creator of the Torrance Test of Creative Thinking, defined creativity as:

“A process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results.”

This process is consistent across disciplines and contexts.

Creative problem-solving comprises the following elements:

- **Fluency:** The ability to generate lots of options
- **Flexibility:** The ability to find options in as many different categories as possible
- **Originality:** The ability to think of unique and novel ideas
- **Elaboration:** The ability to expand upon an option to make it more interesting

The good news is that creative thinking is a learnable skill. Practicing finding multiple creative responses to problems in a variety of contexts can help us overcome entrenched thinking patterns that may inhibit our abilities to find new, original solutions and can strengthen our abilities to identify and solve problems in original ways.

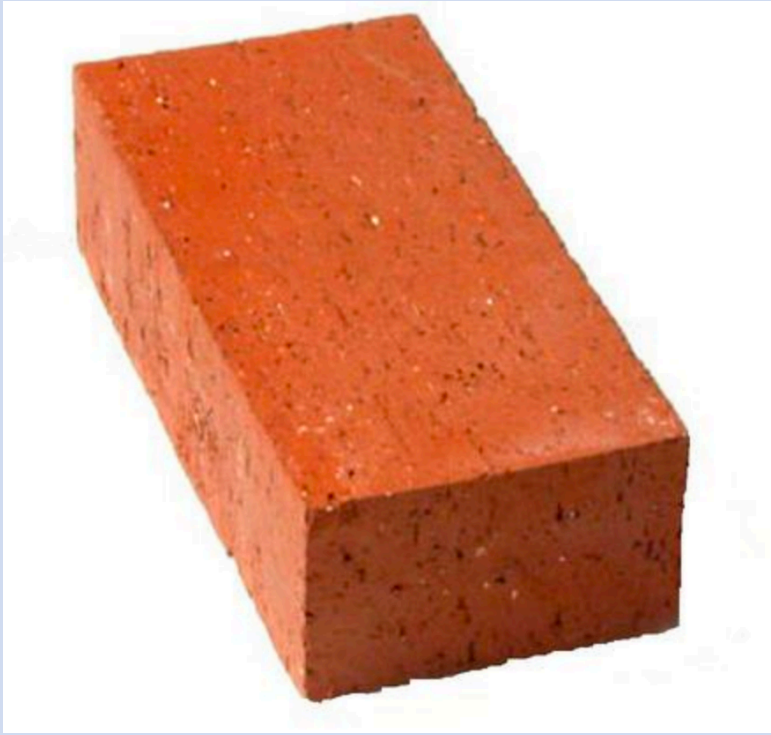
The following exercise invites you to use what are known as *lateral thinking skills* to engage all of these elements. To engage in lateral thinking, we need to let go of learned associations between things.

- Lateral thinking can be used as a powerful tool to change your concept and perceptions and to generate new concepts.
- Lateral thinking allows you to deliberately forget what you have learned and know about everyday objects.
- It gives you permission to unthank what you know and to take your thoughts into unknown and undefined territory.

The main advantage of lateral thinking is the exploration of multiple possibilities and approaches, instead of pursuing the standard approach, that we automatically fall back on.

Functional Fixedness as a Barrier to Creativity

The term *functional fixedness* describes the human tendency to zero in on a specific use for an object, and then cling like grim death to that definition. In 1945 Karl Duncker defined *functional fixedness* as a **"mental block against using an object in a new way that is required to solve a problem."**



For example, when presented with a brick, we typically think of building something with it, rather than using it as a trivet for a hot serving dish, or drawing on the sidewalk with one of its edges, like chalk, or using it as a cat-proof-lid for the open Meow Mix package. Interestingly, children do not suffer from this cognitive bias, as functional fixedness is a product of experience.

While functional fixedness might help us quickly identify tried-and-true solutions to problems it can also present a barrier to creative thinking, which depends on our abilities to find novel approaches to problems.

Breaking free from functional fixedness and looking at familiar objects or ideas from a different perspective often sparks new and original solutions to problems, or inspires new designs. By disassociating an object or idea from its conventional definition, we might become inspired to invent something completely new that more efficiently serves the intended purpose.

As neurologist Gregory Berns says:

“Experience modifies the connections between neurons so that they become more efficient at processing information. Neuroscientists have observed that while an entire network of neurons might process a stimulus initially, by about the sixth presentation, the heavy lifting is performed by only a subset of neurons.

Because fewer neurons are being used, the network becomes more efficient in carrying out its function.”

In other words, once we know how a brick is typically used, its brick-ness becomes inseparable from its expected function.

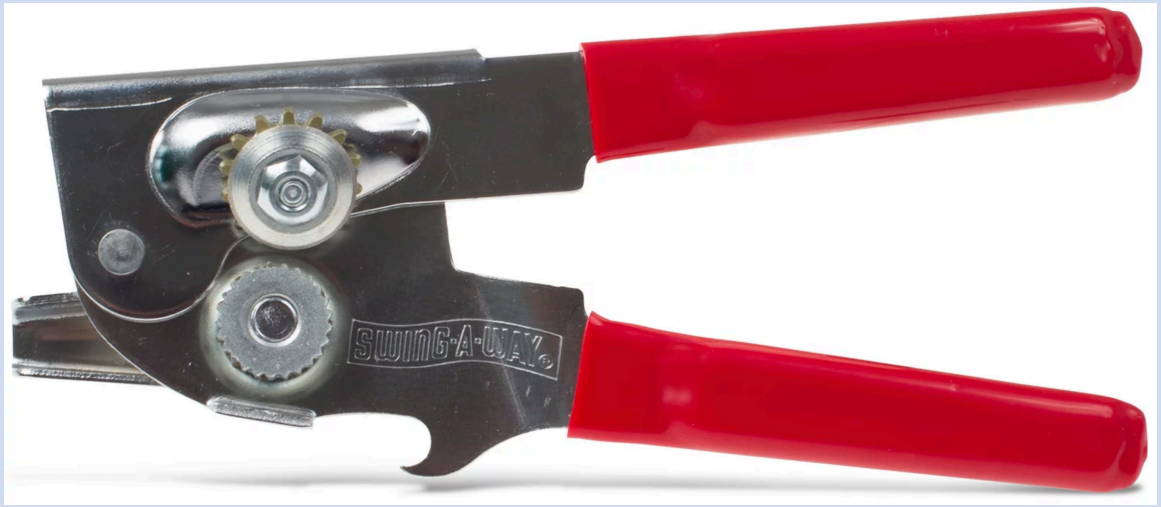
Functional Fixedness Exercise

You will keep a journal as you go through this exercise. This can be a physical notebook that pleases you, sheets of paper, or a word document on your computer. At junctures during the exercise, you will be asked to comment, define, reflect, and create in your journal on what you just did. Journal responses will be posted to Canvas at the conclusion of the exercise, either as word documents or as Jpegs.

Part I: Observation and Description

Step 1

Find a small, commonplace object in your environment. Examples include: a can opener, a screwdriver, a colander, a small toy…Try to choose quickly and don't overthink your selection.



Step 2

Set a timer on your phone or computer (or oven…) for 10 minutes and write a detailed description of your object, using the following prompts.

- Describe the object with **no reference to its function** – how would you describe it to an alien being that has no context for its use?
- Describe the object **to someone who can't see it.** What does it feel like? Does it have a smell? How heavy is it?
- Describe the object only **using shapes** (square, triangle, parallelogram, etc.).
- Describe the object by **breaking it into component parts.**
- Break down the components into **smaller components** and describe those parts. (Repeat, describing the smallest possible components you can.)

Step 3

In your journal, reflect on this process, responding to the following questions:

- What was it like to look at this object for 10 minutes?
- How did the different prompts change the way you looked at the image? What happened with each prompt?

Part II: Alternative Uses

Step 1

Set a timer for 10 minutes.

During this time, write as many uses for your object as you can. Try to think beyond its present function.

What are all the ways you could use this object?

Step 2

For two additional minutes, write uses for your object, changing whatever laws of physics you wish.

What if there were no gravity? Atoms were permeable? Let your imagination run wild…

Step 4

Choose one of the categories below and make a note of your choice in your journal; we'll come back to this later.

1. Furniture
2. Personal items
3. Transportation
4. Scientific instruments
5. Appliances
6. Tools and utensils
7. Weapons
8. Toys and games

Step 5

Find another random object : something on your desk, on the kitchen table

– Don’t overthink it, just grab the first thing you see.

Step 6

Set a timer for 5 minutes

Try combining your original object and your new object. Try a few different configurations.

When you find a form that pleases you, take a picture of it.

(Note: The new object doesn’t need to be self-supporting, you may add elements to keep it in position: something underneath to support it; rubber bands to hold it together, etc.)

Step 8

Next, write a description of your new, compound object it, so it fits the category you chose in Step 4. Don't modify your compound object.

In a few paragraphs, describe the new object’s function in terms of its new category.

What could this new object do? What kinds of activities would it make possible? Go as wild with this as you can.

Step 9

In your journal, write a one-page reflection on the entire activity thus far. (Part I Steps 1-3 and Part II Steps 1-8)

- What was your experience?
- What happened during each part?
- What parts were hard, what parts were easy? Why?

Part III: Application

So, what was the point to this silliness? Researchers at the University of Texas studied this exercise closely. They learned that when people are forced to change the context for what they see and design for themselves, they wind up being much more creative than those who knew their category ahead of time and designed an object to match. A panel of independent judges rated the creativity of each invention, and they found, consistently, that being required to reinterpret your ideas about what something is, what it does, and how it might be modified results in a more creative invention. Why? Because you're forced out of your first assumptions, and you have no choice but to look for surprising new connections and perspectives.

Now, we'll try a version of this process on a problem or idea in your class. This will be a stretch, but that is the point!

Step 1

Choose a research question or something you are thinking about/wrestling with in class.

Step 2

Set a timer for two minutes.

For two minutes, write ten different formulations of your problem, all in one sitting. Try to make them as different as possible from each other. It's important to do this quickly, without taking a break, because working fast will force your unconscious mind to generate an odder, more intriguing mix of ideas. If you spend too much time thinking about your list, your conscious mind will start to censor the ideas, and you'll get only ideas that are “sensible”—rather than surprising and original.

Before you start, see the next slide for an example

An example of the Ten Questions prompt using a classic problem: *"How can I build a better mousetrap?"*

1. How do I get the mice out of my house?
2. How do I catch mice?
3. Why are there mice in my house in the first place?
4. How did they get in?
5. What is the best way to kill a mouse?
6. How can I keep the mice from getting inside in the first place?
7. Why do mice exist in the first place, and how can we force them into extinction?
8. What does a mouse want? How can I make my backyard more attractive than the inside of my house?
9. How can we persuade all the mice to leave our neighborhood?
10. What if mice were so expensive that bounty hunters roamed the neighborhood looking for them? How can I raise the price of mice?

Step 4

Examine your responses, looking for patterns. You'll find that your questions often group into clusters around common themes.

Look for the two or three most promising themes. It's likely that one of the ten new versions of your problem will turn out to be a better question than your original.

Choose one of these new questions that feels like the best fit for further investigation.

Step 5

Set a timer for 10 minutes.

Write as many ways as you can think of to approach solving this problem.

What are ALL the ways that you could find out answers, dig deeper, widen your parameters, narrow your parameters?

Step 7

Based on your answers, refine your action plan.

What is the first step? Second, third, etc.?

Step 8

Post all materials to Canvas site:

- Descriptions
- Reflections
- One-page reflection essays
- Photographs of objects
- Ten formulations of question
- Action plan