HOW *IS* A RAVEN LIKE A WRITING DESK?

Glenn C. Joy

"Why is a raven like a writing-desk?"—Lewis Carroll's *Alice's Adventures in Wonderland*

The Hatter asks this famous riddle, "Why is a raven like a writing-desk?" But the question I want to ask is "What is the answer to the riddle that asks why a raven is like a writing desk?" Are these the same question? I maintain that they are not the same because my question is really a meta-question that includes a number of issues: Is there more than one correct answer? Are some answers correct but not as good as another answer? What (or who) determines what the correct answer is? Are there certain answers that are "out of bounds"? Additionally, I am interested in the question of how one goes about solving a problem or a puzzle. Let us look at some problems.

In 1926 Karl Duncker, a twenty-three-year-old graduate student at Clarke University, did a series of experiments that are still talked about today.[1] The so-called "candle problem" presented subjects with three boxes, along with three candles, matches, and thumb tacks. He instructed them to make a candle holder by attaching the candles to a vertical board. To solve this problem, subjects needed to realize that the candles could be lit, and some of the wax melted onto the boxes so that the candle could be affixed to it. Finally, the match boxes could be tacked to the flat board, to make the candle holders. Duncker discovered that subjects who were presented with the materials enclosed in the boxes had great difficulty solving the problem. This was presumably because they were "fixed" to seeing the boxes merely as containers rather than as independent pieces that could be used as part of the solution. The control group were presented with empty boxes along with the other items. Duncker devised a number of other similar experiments and when the results of all the experiments were analyzed, "solutions to the problems were almost twice as easily found when the necessary objects had not previously been given a different use."[2] It was Duncker who came up with the term "functional fixity" or "functional fixedness."[3]

Now I would like to ask you to put yourself in this scenario:

> You're out hiking in a remote area when you are drenched by a sudden, violent storm. You seek shelter in an abandoned cabin in which you find a pile of 2x4 lumber (each board is 8 feet long), some very rusty carpenter's tools, and some woodworking clamps. You decide to dry out your clothing, gear, and yourself by building a fire in the fireplace (your matches are dry).
>
> It would be good if you could hang up your heavy, soaked overcoat so you decide to build a clothes rack to place near the fire. But you can't find any nails, rope, or wire which you might use to build a sturdy enough structure to hold your wet coat, which must weigh a ton! As a responsible camper, you *don't* want to damage the cabin or its contents. Is there a solution to your dilemma?[4]

Please take a minute to think about solving this problem.

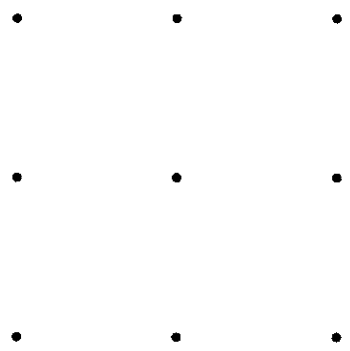
It is clear that most problems and puzzles require background information that is not clearly given in the statement of the problem. Not every person knows what a "2X4" is or

what a woodworking clamp might be able to do, and only few people would know what tools might be left by a "very rusty carpenter." This problem appears on a web-site for a Prentice Hall book called *The World of Psychology* and with a mouse click we are provided with "a solution" to the problem. We should take one 2x4 and wedge it vertically between the floor and the ceiling, and then simply attach a clamp at a suitable height to be used for a coat hook. "Pretty slick, right?," the site boasts using an uncreative comma splice. This solution illustrates the ability to use an item with a clearly-defined function (a clamp clamps, does it not) in a way that is novel (a clamp becomes a coat hook). But, now imagine yourself in *this* scenario: Your spouse comes home one cold, damp day to find a 2x4 wedged between the floor and ceiling in front of the fireplace. Never mind the dripping coat. She just might think you were not a responsible spouse and that you are damaging the ceiling *and* the floor. I might add parenthetically that my wife will never find such a 2x4 holding up a coat in front of the fire in our cabin in the Sacramento Mountains of New Mexico because the ceiling in it is higher than eight feet. What I am trying to illustrate is that in order to reach the solution that the textbook proffers one has to made an assumption about the height of the cabin ceiling and must take the admonition about not damaging the cabin rather lightly in spite of the fact that the only italicized word in the description of the scenario is the "don't" in the phrase "you *don't* want to damage the cabin." Instead, one must apparently figure out that since it is a remote, abandoned cabin with rusty things in it that it is acceptable to wedge boards into the ceiling. Perhaps it is "sour grapes" on my part since I didn't think of this solution but instead envisioned making a tripod rack using clamps in their conventional way. (My construction, although it takes more boards and more clamps, is big enough to hold all the gear and clothing and sits benignly on the floor.)

The "Aha!" that is praised in the cabin problem fits the general framework of the approach of Gestalt psychology. The Gestaltists denigrate rote learning and the simple reuse of previously successful procedures. They emphasize "seeing" the problem as a whole, examining relationships between the parts and relationships of the parts to the whole, the incubation of ideas during times our attention is turned to other tasks, "reorganization" of problems ("refocusing"), and, finally, insight or illumination, as the "aha" moment comes.[5]

I am trying to criticize the analysis that is often made of the candle-problem or wet coat type of experiment. Duncker, for example, clearly says that those who did not use the boxes as candle holders failed to solve the problem. I want to defend—to an extent—those who failed. Problems have constraints on the method of solution. Did Enron management show that they were better problem-solvers than managers of other companies that did not employ illegal accounting practices? No, they were not playing by the rules. The same applies to the problem of getting the ball across the goal-line in football or solving math problems or solving engineering problems. One needs to have some understanding of the boundaries. I would like to know how many in the experiment who were "failures" failed because they understood the rules of the game differently. It is not necessarily a problem-solving failure at all. Suppose that expermenter holds out objects in her hand and says, "Here are the items you may use to do this task." If the only way to solve the problems was to actually use the experimenter's hands as materials (Well, they could be candle holders couldn't they?), we should rightly think we had been tricked rather than that we had failed to solve the problem. I think that good experiments should not have such ill-defined parameters. The Gestaltists do, however, have other and better experiments.

In addition to the series of situations that were examined by Duncker, there have been a number of experiments down through the years that have become pretty well-known. Scheerer's nine-dot problem[6] presents a three-by-three grid of dots and requires one to draw four straight lines without lifting the pen off the paper to connect all the dots.



The difficulty with this problem results from one's focusing on the square shape and assuming that the space defined by the dots is the only space that can be used. Hence, this shows an example of another type of functional fixedness.

Another set of experiments developed by the Gestalt school demonstrated fixity or problem-solving "set" using the water-jug problem.[7] Imagine you are given three jugs of the sizes shone (the units of measurement are unimportant), each full of water. Your goal is to finish with one container with exactly the amount of water listed as the goal. You may pour water into another jug or just pour it out. I will list a series of problems and it is important that they be solved in order.

	Jug A	**Jug B**	**Jug C**	**Goal**
(1)	21	127	3	100
(2)	14	163	25	99
(3)	18	43	10	5
(4)	9	42	6	21
(5)	20	59	4	31
(6)	23	49	3	20
(7)	14	36	8	6
(8)	28	76	3	25

What typically happens is that people who work on all the problems in order will solve the problems at the beginning by pouring out the water from Jug A and then filling it from Jug B leaving 106 units in B. Then empty C and fill from B and repeat, leaving 100 units in Jug B. That sequence of "B minus A minus 2C" will work until one gets to the eighth problem. Experiments show that eighty percent of persons who see all the problems try to use the "B - A -2C" formula on problem eight and that sixty-four percent fail to solve the problem. However, persons who see only problem eight virtually never try the "B - A -2C" formula

(only one percent do) and only five percent fail to solve the problem.[8]

It is hard not to be impressed by this kind of experiment. I believe these experiments demonstrate conclusively how useful it can be to try to avoid "getting into a rut" as people used to say. We can also use this information to reflect on the current emphasis on judging public education's success by emphasizing standardized tests.

So, how can we account for the rise, starting in the middle of the last century, of the information-processing approaches to problem solving?[9] Well, it avoids the vagueness of "insight" and "refocusing" and "seeing the problem as a whole" and emphasizes instead a series of "states," the initial state, a series of intermediate states and finally the goal state. It is no coincidence of course that interest in this approach coincides with the development of computers. They present the perfect medium for successful implementation of this approach. It is easy to program a computer to solve water jug problems and to solve them efficiently. If you go back to the list of those problems and start with number six, you will notice there is a method much simpler than the "B - A -2C" formula. A computer or someone approaching the problem with a fresh mind would easily find this shorter answer. The information-processing approach is wonderfully efficient in solving certain types of well-defined problems. It is woefully lacking when solving ill-defined problems. Life's most important problems are ill-defined.

And many of life's least important problems are ill-defined. So, how is a raven like a writing-desk? This is not a question that lends itself to the information-processing approach. It is an ill-defined problem because the character of the goal-state is unclear. Carroll had no answer in mind when he asked the question. He apparently was just asking what he though was a nonsense question in the rather absurd scene of the mad tea-party. But, if you ask it, they will answer. And answer they did. And also they did ask Carroll what the answer was. Carroll finally published an answer in a later edition of *Alice's Adventures in Wonderland,* suggesting that "it can produce a few notes, although they are very flat, and it is never put the wrong end front." But he can hardly hold himself out to have "the" answer when he had to made up one after the fact. So, I think that makes each of us the judge of the answers. And I think it is clear that some answers are better than others. What if someone suggested that the raven is like the desk in that they are both made up of atoms and molecules? Well, "Yes" but that isn't a good answer. It works for any object. It cannot be much of a riddle if the same answer works for any such question. (I guess it does not work for an answer to "Why is Being like Nothingness?") I think Carroll's answer is a good one because the answer to a pun-loving wordsmith's puzzle should involve a well-crafted pun or in this case two puns. (In fact Carroll originally used the palendromic version of "raven" in place of "never.") But as I said earlier, people responded to the Hatter's riddle and have been doing so ever since. How about, "Neither begins with an n "? That is what the answer would sound like orally, but it would be correctly written as, "'Neither' begins with an n." A nonsense answer for a nonsense riddle. I want to end with a number of my favorite answers to the riddle.[10] And leave you to figure out what approach to puzzle-solving would best lead to these best answers. "Because one has flapping fits and the other has fitting flaps." "Because one is good for writing books and the other better for biting rooks." "Because a writing-desk is a rest for pens and a raven is a pest for wrens." "Because they are both used to carri-on de-composition." And, finally, short and sweet and my personal all-time favorite from the puzzle genius Sam Loyd, "Poe wrote on both."

NOTES

[1] See Karl Duncker, "On Problem-Solving," L. S. Lees, trans. (*Psychological Monographs*, 1945, 58, whole number 270, quoted in Floyd L. Ruch, *Psychology and Life*, 5th ed. (Chicago: Scott Foresman and Co., 1958) 362.

[2] 362.

[3] The situation is different with children, however. "Using a task analogous to Duncker's candle problem, we have shown that young children are immune to functional fixedness. In one series of studies, 5-year-old children were faster than children two years their senior in solving a problem involving the use of a toy-box as a platform rather than a container, when the box was presented filled. When the containment function was not demonstrated, the reverse age effect was found. This result was shown to be replicable, and unaffected by drawing all children's attention to the test object using a verbal label, a manipulation that has attenuated functional fixedness in adults." This quotation is from an abstract of a paper entitled "Developing knowledge of function and the solution of insight problems" by Tim P. German , Jan. 8, 2003, <http://www.isisweb.org/ICIS2000Program/web_pages/group331.html>.

[4] Jan. 8, 2003, <http://www.prenticehall.ca/wood/home/tryit/cognition1.html>.

[5] See, for example, the web-site of Prof Erwin Segal of the State University of New York at Buffalo, Jan. 8, 2003, <http://pluto.fss.buffalo.edu/classes/psy/segal/416f2001/416gestalt.html>.

[6] M. Scheerer, "Problem Solving." *Scientific American*, 208(4) 118-128.

[7] A. S. Luchins and E. H. Luchins, *Rigidity of Behavior: A Variational Approach to the Effect of Einstellung* (Eugene, Oregon: U of Oregon Books, 1959).

[8] Jan. 8, 2003, < www.psych.utah.edu/psych3120-classroom/04_16_02.pdf>.

[9] See A. Newell and H. A. Simon, *Human Problem Solving* (Englewood Cliffs, NJ: Prentice-Hall, 1972).

[10] These are all found in Martin Gardner, *The Annotated Alice: The Definitive Edition* (New York: W. W. Norton & Company, 2000) 72-73.