

Guest Editor's Introduction

## The wavicle of creativity

In any field of science, progress depends on a clear conception of the topic under study and a toolkit of methods that enable researchers to tackle specific questions in an empirical manner. Since the pioneering work of Guilford half a century ago, the *experimental study of creativity* has been plagued by the lack of both. While much ink has been spilled over creativity from the social, psychological, developmental, and historical perspectives, filling shelves of books and articles, we know very little about the mechanisms, cognitive or neural, that give rise to creative mentation. What's more, the little work there is is, ill-conceived, based largely on a few simplistic notions, all roughly dated from the 1960s, that creativity can be captured with the concept of divergent thinking, involves somehow the exploration of remote associations, and is located somewhere in the right hemisphere. If we are to make progress in this neglected area of psychological science, these notions, along with a few others, will have to be demolished.

Although there are undoubtedly several reasons for this stagnation, a major stumbling block has been the fact that creative thinking is such a slippery thing to catch *in flagrante*. One cannot simply take a volunteer, shove her into the nearest brain scanner and tell her: now, please be creative! To most scientists, the prospect of studying creativity in the lab must seem like trying to nail jelly to the wall. One solution to this impasse has been the development of standardized tests that can measure some aspect of creativity. The upshot is, of course, that a hitherto intractable problem is brought into the folds of empirical science. The downside, however, is the danger that this can just as easily backfire if either (1) the instruments have little validity because they are based on misguided theorizing or (2) even if some validity exists, they wag the dog because researchers brush aside the fact that they are looking at only one small part of the problem. This, I submit, is what has happened to the experimental study of creativity.

Take the notion of divergent thinking. Proposed some 50 years ago in an initial attempt to distinguish creative from noncreative—convergent, in this case—information processing, it has indisputably helped jump start empirical

inquiry into creativity. But from this rather promising beginning, in a development that even Guilford did not intend, this humble idea has morphed from a tentative hold on a hard-to-pin-down phenomenon into *the* standard conception of creativity, dominating theoretical and empirical work ever since. Perhaps this is just the way things go, but on a moment's reflection, one cannot help but wonder how, exactly, creativity ever became so closely associated, if not effectively equated, with divergent thinking? For, it could not have well escaped generations of psychologists that creativity—given its putative definition of work that is both novel and appropriate—can just as well be the result of convergent thinking. What would we otherwise make of Edison's assembly-line, nearly algorithmic approach to inventing, Bach's methodical way to compose hundreds of cantatas, or the numerous occasions on which each one of us derived a creative solution by way of systematic deduction? Once we understand that creative acts arise from both, divergent and convergent processes, the distinction becomes meaningless as the theoretical basis for the study of creativity. Think about it, what good is the distinction—for studying the fundamental nature of creativity, at least—if it does not discriminate between creative and normative information processing? It is not strictly true, of course, that this matter has escaped the notice of psychologists, and many who work in the field of creativity have questioned the usefulness of divergent thinking as a construct. But this, and here is the rub, you could hardly tell from the perusal of the psychological literature. Even when investigators acknowledge the problem in their introductory remarks, mostly because some reviewer forced them to, they then quite predictably proceed, as if this acknowledgment somehow turned the water into wine, to use the construct anyway. This has had the curious effect that we have an experimental study of divergent thinking. This is not what we want. We want an experimental study of creativity!

When it comes to mechanistic explanations, the field of creativity is riddled with examples of such misdirectors of attention. Open any source on the topic, academic or otherwise, and you will find creativity linked with, say,

low arousal, defocused attention, right brains, unconscious processes, lateral thinking, altered states of consciousness, or mental illness, to name but a few popular themes, when commonsense alone tells you that their opposites are also sources of creative thinking. This reminds me of the turn-of-the-century debate in physics on the nature of light. Is it a wave or is it a particle? As it happens, quantum physics showed it to be both, a wavicle.

Again, it is not strictly true that this kind of myopic theorizing has remained unchallenged in the field, but psychologists have not appreciated how damaging this premature “it’s-this-but-not-that” approach has been to progress in the field. Nor have theoretical advances that break creativity into more meaningful chunks, such as the creative cognition approach, had the broad influence they should, particularly with respect to the development and use of new experimental methods. As a consequence, we find that, after nearly half a century of work, there are few sound empirical data on the mechanisms underlying creativity. In light of this, it is perhaps equally unsurprising that current psychometric measures of creativity possess so little validity and predictive power. In all honesty, can we really expect a testing instrument that asks you to imagine alternative uses of a safety pin to pick an Einstein from a certified public accountant?

All this makes the task of editing a special-topics issue titled *Neurocognitive Mechanisms of Creativity: A Toolkit* a difficult one. Without a clear sense, in either cognitive or neural terms, of the critical elements that distinguish creative from other mental processes, current methods for the study of creative behavior are necessarily exploratory. Therefore, the approach taken in this issue is, I suspect, somewhat unique to the journal *Methods*.

First, as the articles in this issue collectively underscore, it is virtually impossible at this point to make a contribution to the field that is purely methodological in nature. There are simply too few reliable and established methods specific to the experimental study of creativity that one can describe. But it is also precisely this hitch that makes the present issue so exciting. Faced with the misbegotten fossil traces that besiege the discipline, researchers interested in the mechanisms of creativity are forced to develop fresh methodological approaches. Although the selection of articles presented here was based on several criteria, they all have in common one

thing; that is, they attack the problem of creativity in a novel way. For many articles, this takes the form of adapting a technique that proved useful for some other problem and tweaking it so that it becomes useful for creativity research, while other articles in this collection describe entirely new methods that are specifically intended to study creative processes. In either case, authors often found it necessary to inject a heavy dose of theory into the article to explain the rationale that guided their protocols.

Second, nearly all contributions featured in this topical issue are informed by current thinking in neuroscience and cognitive science. The rapid progress made over the past few decades in our understanding of the brain and how it processes information will surely revitalize the search for the mechanisms underlying creative thinking. But even as neuroscience and cognitive science are gaining the strength of a tidal wave, reaching even the most remote outposts of the psychological sciences, they have yet to make serious contact with creativity research. This is somewhat surprising as both have long wrestled with topics—memory, attention, perception, knowledge representation, etc.—that have a clear and present relevance to creativity. In only the past couple of years, however, this has started to change. As a few neuroscientists have turned their glitzy neuroimaging tools to questions of creativity and insightful problem-solving, and some cognitive psychologists have devised a host of new tasks of creativity that reflect contemporary knowledge of cognitive processes—working memory capacity, executive attention, implicit memory, etc.—one gets the sense that the experimental study of creativity might finally have passed through its awkward, ugly period of featherless development and is about to take flight. This issue, then, represents a cross section of these first serious attempts to integrate cognitive neuroscience with the knowledge base of creativity. The selection of articles is necessarily incomplete but it is hoped that it will spark imitators. It is high time that researchers become more creative about creativity.

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