

25. Parsimonious creativity and its measurement

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Abstract

The accurate measurement of creativity is necessary for realistic, meaningful, and valid research, as well as for applications of research findings to education, industry, or policymaking efforts. This article identifies several key issues involved in the measurement of creativity. Some of these are straight out of psychometric theory: sampling, reliability, validity. Others are more general and involve communication about and interpretation of measurement objectives and results. Of particular relevance are indicators and predictors of creative performance. Too often these are mere correlates and not causally related to all creative actions. A new theory of parsimonious creativity is outlined and seems to be helpful with many of the measurement issues and concerns. It focuses on processes which are vital — not just sometimes relevant to — creative efforts. It also offers an explanation for, rather than mere description of, creative behaviour. This requires a focus on causal factors which are universal and involved in all creativity. This article presents the perspective that the largest return on any investments in creativity will result from those which look to parsimonious creativity and which focus on creative potential rather than on high-level, unambiguously creative persons.

Parsimonious creativity and its measurement

There is no reason that the field of creative studies should not itself be creative. This may be especially useful when it comes to the question, 'Can creativity be measured?'

Creativity requires originality and novelty, and it is usually unpredictable, so it is a very difficult thing to measure. Accurate measurement is, however, necessary if we are to understand the creative process, fulfil creative potentials, conduct meaningful research on creativity, or develop social and educational policies which will in fact support creative efforts. All of those depend on valid measurement.

There is reason for optimism. After all, there is evidence that many aspects of creativity can be enhanced. Enhancement might result from appropriately motivating individuals, by developing the right attitude, or by teaching the tactics that lead to original and creative ideation and behaviour. If creative thinking can be enhanced, why not enhance the field itself? Again, why not insure that creative studies are themselves creative?

I have used several specific tactics in the past few years when thinking and writing about creativity. Three tactics have proven to be particularly useful. One involves *questioning assumptions*. The creativity literature contains many examples of insights which have resulted from a questioning of assumptions. Numerous case studies have demonstrated how famous individuals have made great discoveries shortly after their assumptions were intentionally or unintentionally brought into question. There are also numerous examples of groups and individuals who were unable to solve problems or opted for a poor solution because they made bad assumptions. One of my own favourite examples of this kind of failure is the introduction of the mongoose to the Hawaiian islands. This was intended to decrease the number of rats but there was an assumption that predators (mongoose) will always find prey (rats). This overlooked the fact that the mongoose is diurnal and the rat nocturnal. Now the Hawaiian Islands have huge numbers of both mongoose and rats and they apparently never encounter one another.

The theory of *parsimonious creativity* came about by a questioning of assumptions. In particular, I considered 'What assumptions are being made in creative studies?' One assumption quickly came to mind. It has been a part of creative studies for many years. This is the assumption that creativity represents a *complex* or *syndrome* (e.g. MacKinnon, 1965; Mumford & Gustafson, 1988; Runco & Albert, 1989). This idea may not seem to be an assumption per se, and it was initially suggested by observations and data, but for quite some time now the idea of creativity being a complex has not been questioned. It has been taken for granted, a given, and for our purposes here, an assumption.

I held this assumption myself for many years. But after completing two sizable reviews of the creativity literature (Runco, 2004, 2007), I realised that there were reasons to question it. The more recent review was especially helpful because it concludes with a chapter titled, 'What Creativity Is, and What It Is Not'. My objective in that chapter

was to show that creativity differs from Discovery, Invention, Innovation, Originality, and Imagination. Each of these things sometimes overlaps with creativity, but a good theory should be able to discriminate among them. As I attempted this discrimination I realised that this would be the most useful and realistic if creativity was defined in a parsimonious fashion. Only then could it be extricated from related capacities and behaviours, such as those listed above. Although no single core characteristic that would explain all creativity and refute the idea of a complex was then immediately obvious, I had a very strong hunch that there was some very simple underlying process and that all manifestations and correlates described in the creativity literature as indicative of the complex were in fact interrelated because they were each in some way tied to this simple underlying process. (I will return to the wording of this claim later in this article. The focus on 'process' implied by that sentence is a vital aspect of parsimonious creativity.)

The first two reasons for questioning the creativity complex were, then, (a) a hunch based on fairly comprehensive reviews of the research, and (b) a recognition of the value of questioning assumptions. There was in fact a third reason to explore parsimonious creativity. This is implied by the fact that the label parsimonious creativity is being used here instead of simple creativity. It was also implied by the brief discussion of discrimination, above. Simply put, parsimony is a very important part of the scientific method. It is a very useful thing for measurement. Thus a theory which describes creativity in a parsimonious fashion would be preferable to one which emphasises its complexity. Clearly a good theory must also be logical, coherent, and consistent with data, and the role of parsimony is usually described by saying that if there are two theories which are equal in terms of logic, coherency, and data, the simple one is better. Parsimony alone is not convincing, then, unless it has those other things going for it.

One objective of this article is to explore the logic and coherency of the theory of parsimonious creativity. Another is to explore measurement options and issues. Previous data that are consistent with the theory of parsimonious creativity are cited and the pros and cons of measuring creative potential instead of creative performance are noted. First the usefulness of other tactics should be mentioned.

Tactics for creativity

Question assumptions is a useful tactic. A second very useful tactic might be called *consider the opposite*. This is probably related to other tactics and suggestions, such as 'turn it on its head', but the key idea is that different ideas are found by looking at the broadest possible range of options, and that includes going to the opposite extreme.

Very recently I tried this while working on a edited volume devoted to malevolent creativity (Cropley, Cropley, Kaufman, & Runco, 2009). I agreed to co-edit this volume because it focused on an important aspect of creativity research. It would be nice to understand and perhaps minimise or avoid the dark side! But I applied the tactic mentioned above and concluded that there is no dark side to creativity. My chapter in that volume is surely contrarian; all others describe the dark side and I conclude that creativity has no dark side. In my defence, this is based on research showing that the creative process is initially blind (Runco, 1990; Simonton, 2008) and therefore not directed towards benevolent or malevolent ends, at least at first. It is also based on theories of moral relativity. Of most relevance is that it distinguishes between creative products and the creative process. The former can be malevolent, but the latter is blind and free of values and potential harm. As we shall see below, that distinction between product and process is germane to the present discussion about the measurement of creativity. More on that below.

The third tactic of note involves *changing the problem or question*. Too often problems, tasks, assignments, or questions are accepted as given. They can misdirect problem-solving efforts, and frequently there is a benefit to changing the problem or question. It can be a good idea to reframe the question, redefine the problem, reword the question. This is in part justified by the sizeable literature on problem finding and creativity (Csikszentmihalyi & Getzels, 1976; Runco, 1994) and by the numerous examples of creative breakthroughs that have resulted from such liberties. And this is useful with the question given to participants at the 2009 Brussels conference on creativity and innovation. Indeed, instead of addressing the given to the participants, I suggested that 'Can creativity be measured?' be changed to (a) 'What expressions or components of creativity can be measured?' and (b) 'What are the best methods to accomplish that?' These may not seem like major changes, but there is a significant change implied. For one thing the proposed rewording of the question requires focus and, as suggested above, parsimony. It may even suggest that our discussion does not look to measure creativity!

That possibility will make sense if you examine how often the word *creativity* is used in the creativity literature. Also consider how often the phrases *creative people* or *creative person* are used. Those two phrases are always generalisations, for what applies to some will not apply universally. Clearly there are large differences between different eras in terms of what is creative, as well as differences between different cultures, ages, and domains. The noun *creativity* is used with so many different definitions that communication is very difficult. It is used to refer to one thing by some theorists and writers but used to refer to something completely different by others. It was

for that reason that I suggested that the noun creativity not be used. Communication would be much more effective if the adjective was always used instead. This would require specificity and avoid confusion.

That idea could be used in tandem with the different expressions of creativity that are suggested by Figure 1. It presents a modified version of the classic framework originally proposed by Rhodes (1962) to cover all research strands relevant to creativity. Rhodes identified person, process, product, and press (or places) strands. Simonton (1995) later added persuasion, the idea being that creative ideas and people change the way others think. I then reorganised these alliterative perspectives into a hierarchy, which is in Figure 1.

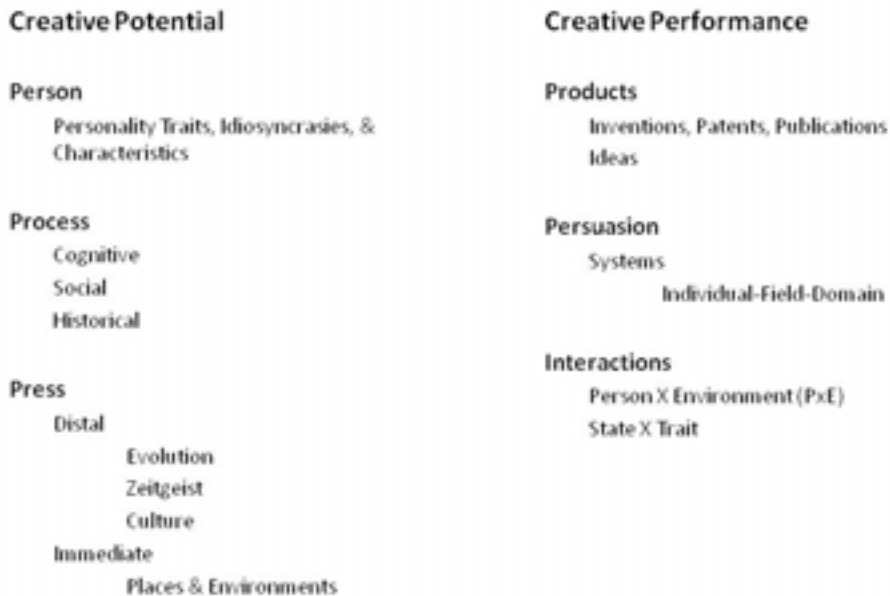


Figure 1: Hierarchical framework for the study of creativity

This is relevant in part because it suggests some of the alternatives for measurement and for the use of the adjective. There are creative personality traits, creative products, creative achievements, creative processes, and each may differ from the others, but much confusion will be avoided if there is always this kind of specificity required by the adjective.

A new alternative is presented in Figure 2. It suggests an actual chronological or developmental progression, and that, of course, should be useful to psychometricians

and anyone who is interested in policy decisions and fulfilling potential. Figure 2 suggests that there are several indicators of creative potential, including particular cognitive capacities (e.g. divergent thinking) and certain personality traits. These, along with *press* (climate and environmental influences) are necessary but not sufficient for actual creative performance and achievement. They are, again, indicators of potential. Note that they are not 'mere indicators of potential'. That is because they should be targeted in policy and in educational or any enhancement effort. In fact, it is by targeting potential that we will get the largest return on our investments! Individuals with potential can make huge improvements, which will in turn translate to huge changes on societal levels. Work with individuals who are already creative may have benefits but the return is likely to be much lower since they are already close to maximal levels of performance.

- Potential
 - Person
 - Process
 - Place
- Performance
 - Product (most objective, least informative)
- Persuasion
 - Social
 - Historical

Figure 2: Chronological rearrangement

Figure 2 also includes actual performance indicators. These are also possible measurement objectives. And in fact, these can be measured much more objectively than the indicators of creative potential (Besemer & Quin, 1998; Simonton, 1990). Yet that is one of the issues in creativity measurement. We might be as objective as possible, in which case the focus of assessment should be on products and unambiguous indicators, but that will not tell us how to fulfil potential, and as such, for reasons just given, it insures that the return on our investments will be only marginal.

Measurement issues

There is thus an overarching issue about (a) maximal objectivity in measurement, or (b) maximal return on research and enhancement efforts. There are other psychometric issues which apply to both types of measurement, that which focuses on performances and products and that which focuses on indicators of potential. These can be summarised fairly briefly.

Measurement is a metaphor. What this means is that any result of measurement, be it a score, index, or whatnot, is not equivalent to actual creative behaviour. It is best to view scores and indices as estimates. This reminds us that there is a difference between a test score or measure and actual behaviour.

Along the same lines, indicators and predictors do not guarantee actual performance. They vary in terms of their validity, which is often a quantity that suggests how trustworthy they have been in the past.

Note here that measurement is not a kind of hypothesis testing. Most research in the behavioural and social sciences tests hypotheses and uses statistical tests of significance. This is not true of psychometric research, including that which measures creative potential and creative performance. Psychometric research provides a level of validity (and reliability, for that matter). An accurate measurement has a validity coefficient near 1.00. (Actually, a validity coefficient of .70 is very good in studies and predictions of creativity.) The point of this is that decisions about measurement are not really either/or nor dichotomous. In fact, here again it is useful to change the question. Instead of 'Can creativity be measured?' we should ask 'To what degree can the components of creativity be accurately assessed?'

Even this needs to be qualified because validities do not generalise well. A measurement may have good validity in one population but not in others. That applies to cultures, with some tests valid at a high level in some cultures but not others. It also applies to various settings. Divergent thinking tests are reasonably valid in permissive environments, for example, where examinees know they can be playful, exploratory, and original, but they have low validities in test-like environments and settings.

Predictors are not criteria. This has been recognised for years (Vernon, 1960), but still it is tempting to find a predictor of creativity which seems to have good validity and then use it as a criterion of creativity. Unlike criteria, predictors are only used to estimate future performance.

Many measures depend on correlations, and correlations can be misleading. Correlational methods are often used to determine the level of validity, and in fact indica-

tors are often identified in correlational research. This must be emphasised because it means that all limitations of a correlation apply to our interpretation of validity and indicators. In one recent example of the correlational fallacy, data from the Federal Bureau of Investigation (FBI) were used to develop profiles of serial killers. Results indicated that serial killers tended to have 'an exaggerated sense of self-worth, glibness, lying, lack of remorse, and manipulation of others' (Malcolm, 2009). The same analyst who identified this traits quickly realised that they are also characteristic of American politicians! There was, then, an apparent correlation here, but it is doubtful that there is an actual relationship between being a serial killer and being a politician. This example does not use statistical correlations, but they too often suggest relationships that are entirely bogus (usually based on a hidden variable which is causally related to those measured), and perceived correlations (those lacking statistical support) are surely even more common and troublesome (Tversky & Kahneman, 1980).

Aggregates do not apply to individuals. Suppose the best measures of creative potential are found and then used to make policy decisions. Suppose further that the policy applies to education, and thus schools and educators are required to follow certain proscriptions. This may be useful, some of the time, but most research, and most indicators, are based on aggregates, and aggregated data apply to samples but not individuals. Simplifying, there is always variation, but aggregates are usually based on central tendency, and this says nothing about anyone who is not close to the mean or average. There are statistical ways to deal with this, or at least recognise it, but when it comes to actually working with individual students, it means that policies developed from aggregate data may not apply at all!

These issues and concerns are not intended to paint a bleak nor pessimistic picture of the possibility of measuring creative potential and creative performance. I have devoted my career to the measurement of creativity (Runco, 1986; & Albert, 1985; Runco et al., 2002) and believe it is vital for understanding creativity and for fulfilling creative potentials. But just as care must be taken when, say, using a power tool or riding a bike, so too must measurement be done while cognisant of the issues and limitations. Power tools and bikes are great fun and often quite practical, but you can use them just any way you like. Creativity has its own set of limitations, some of which I attempted to capture in the short list, above.

Causality and creativity

If possible, measurement should focus on behaviours and capacities are definitely, universally, and functionally tied to creative potential and performance. Various re-

sults, correlates, products, and effects of creative work have been identified, but policy should not rely on them. They come too late in the day, after the creative work has been done. They are results not contributions to the creative process. I am again assuming that measurement should be parsimonious.

One large step towards useful measurement can be taken by thinking further about the scientific method. It is often directed toward causality. B. F. Skinner (1970) suggested, for example, that science should predict and control. Implicit in that is the need to understand cause and effect. If you can predict and control, you must have a pretty good understanding of cause and effect. Experimental methods imply the same thing. Simplifying, these are used to manipulate independent variables (causes) from dependent variables (effects) and to insure that the two are related by eliminating as best you can nuisance or confounding variables. Come to find out, it is fairly easy to examine aspects of the ostensible creativity complex and to classify many parts of it as either causes or effects. Consider an invention, for example. Clearly that is a result of the creative process and that invention cannot be manipulated to boost or alter creative efforts or the creative process. The same thing can in fact be said about all products and results of the creative process. If they are useful towards predicting and controlling creativity, it is only because something is learned from them and that is then used as feedback or direction for subsequent creative efforts — in which case it is not the product per se that is a cause or influence.

A second big step follows from this discussion of causes and influences. In particular, measurement should distinguish between necessities and mere influences. The former are required; without them, there is no creativity. The latter, on the other hand, may sometimes be involved, but may sometimes be irrelevant. Intrinsic motivation may exemplify this. That is because the creative process usually seems to benefit from intrinsic motivation (Conti et al., 1996; Eisenberger & Shanock, 2003), but not always. Sometimes extrinsic factors benefit creative efforts and insights.

A third step is also suggested by the idea of influences. Influences can, by definition, have an impact on creative efforts. There are, however, things with apparent but illusory influence. Eccentricity is one example of a correlate of creativity which was eliminated from the theory of parsimonious creativity and can probably be eliminated from policy and measurement efforts. Admittedly, many creative people appear to be eccentric, but it is not a necessary part of creativity. It is not required for creative thinking, which is why many creative people are not eccentric. This is an important point because, not only does it allow us to eliminate several things in the creativity complex

(e.g. eccentricity, and certain forms of unconventional behaviour), but it is also practical. If eccentricity is included in a theory of creativity and thought to be a causal factor, someone might think that they need to be eccentric to be creative. They may boost their eccentricity assuming that creativity will necessarily follow. That is an illustration of a *misplaced investment* (Runco, 1995).

It is possible that eccentricity always produces originality, but more accurately it is associated with unconventionality. True, that can, in turn, relate to originality, but even that does not mean that eccentricity is necessarily a good thing. Even though originality is a necessary part of all creativity, creativity is not just originality. Eccentricity does nothing for the other part of creativity, which is effectiveness. Originality without effectiveness is just originality, and sometimes far from creative.

This may imply that creativity cannot be defined in a parsimonious fashion, but parsimony does not mean unitary. It does not mean that creativity must boil down to one single trait. Parsimony is a scientific guideline that suggests that 'the simpler, the better' but there is such a thing as too simple. We do not want oversimplification. We do not want any simplification that is inaccurate or unrealistic. We want parsimony that is as simple as possible while remaining accurate and realistic. That appears to be creativity that includes both originality and effectiveness.

As a matter of fact what is needed is yet another tactic. Even more clearly than the three tactics mentioned above (question assumptions, consider the opposite, redefine the problem), this fourth tactic has been suggested by famous creative breakthroughs and has also demonstrated its effectiveness in experimental research. Arieti (1984), for example, described a magic synthesis, and Rothenberg (1999) demonstrated in the laboratory the benefits of creative syntheses and what he called Janusian thought. In the present case it is easy to view originality and effectiveness as two separate things, but in reality they often come together in creative things. Creative things are original, but not just original. They are effective, but not just effective. Creative ideas and products are both original and effective.

Although I am suggesting that we should look to the scientific principle of parsimony for the best possible understanding of creativity, this does not mean that the best approach is the most traditionally scientific. Rogers (1954/59) and Maslow (1968) were correct that blind reductionism would preclude a realistic understanding of what it means to be human, and that logic also applies to creativity. Although there are benefits from separating causes from effects and possible influences from required aspects of creativity, it certainly is not true that creativity should be equated with the smallest possible trait or process. Consider again originality. It is generally thought to

be a universal part of all creative things. It is necessary for creativity, but it is not the same as creativity. Other things are required for creativity; originality is necessary but not sufficient. If we reduce creativity down as far as possible, we might find one universal (originality), but we have also gone too far, simplified too much, and have lost sight of actual creative behaviour.

The most difficult part of approaching and measuring creativity in a parsimonious fashion is that it may require a change in the way we think about it. Instead of thinking of it as made up of components, it is better to identify what is necessary to all creativity, discriminating to separate results and products, and to then accept that the result, even though not a simple thing that can be labelled with any one word, as the most parsimonious we can be about creativity. After all, if there was one word that could be used, it would be that thing and not creativity.

Actually, there is one word for it: *creativity*.

Domain specificity

A fourth and last step towards meaningful measurement is suggested by the concept of domain specificity. The idea that creativity differs from one domain to another has been around for quite some time. It is apparent in the work of Patrick (1935, 1937, 1938), for example, and in the seminal research at IPAR with writers, architects, and other specialists and experts (Barron, 1962, 1969; Hall & MacKinnon, 1969; Helson, 1973). Domain specificity might, however, seem incompatible with the extreme view of parsimonious creativity. Domain specificity requires variety, while parsimonious creativity requires simplicity and generality.

The solution is to identify the key to creativity which is a part of all domains. That would allow creativity to be expressed in different ways in different domains, but it would preserve the idea that all creativity hinges on a simple process or capacity. And as a matter of fact there are theories that imply just this kind of thing. Conti, Coon, and Amabile (1996), for example, separated *domain relevant skills* (e.g. technical skills, often developed in education) from *creativity relevant skills* (e.g. appropriate cognitive styles). The latter would be useful in all creative efforts, not just those within one domain. Amabile's model also includes *task motivation* (e.g. an individual's ability to de-emphasise extrinsic constraints). Runco (1996, in press) also described a general creative potential which applies across all domains, including informal and ambiguous domains, such as the natural environment (i.e. everyday creativity). This potential is made up of (a) the capacity to transform experience into original and useful interpretations, (b) the discretion and judgement to know when to construct new interpre-

tations and when to rely on existing knowledge. For Runco (in press), ideas are also generally useful across domains.

Conclusions

I began by suggesting that we can be creative about the measurement of creativity. I used four tactics to demonstrate this. One other part of creative efforts is also useful. It too is justified by what we know about the creative process, and thus it is another example of practicing what is preached. It is, however, questionable that policymakers are prepared for this suggestion, even if it is clearly tied to creativity. I am referring to risk tolerance and risk-taking.

After all, creativity is an elusive and complex objective. It will take some creativity to measure it and to develop a method for cross cultural comparisons. There will be risk involved, for example, and of course risk is a big part of many creative efforts. These efforts always explore the unknown, or at least that which is original, and thus the payoffs and effects are by and large ambiguous. This is also true of investments in creative potentials.

The risk is worthwhile. As an educator I have always felt that every student has creative potential which can be fulfilled, though some may respond more than others. Still, I would rather attempt to fulfil every student's potential, and perhaps fall short some of the time, rather than focusing on individuals who are gifted in such a way that there is a guarantee that they will respond well to enhancement. Surely much the same applies on the societal level.

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