

Measuring Creativity

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Introduction

The purpose of this paper is to discuss how one might devise a test for creativity, and how such a test might differ from related tests for knowledge, skills, general intelligence, verbal intelligence, quantitative intelligence, memory, common sense, personality, and motivation.

One might logically ask, why measure creativity? Measuring creativity may be useful for hiring university faculty or corporate executives. For example, when admitting students to graduate research in Ph.D. programs academia should have some objective grounds that these students will be productive scholars. It may also be useful in research situations where one is attempting to determine what causes creativity or what improves creativity across different types of people or in before-after situations.

As far as the scope of creativity is concerned, it may not be so important to have multiple talents than being very creative in one field. We do not expect anybody to be another Leonardo DaVinci or an all-round talent like Johann von Goethe. It is enough to be a Thomas Edison. He was only highly creative in matters of physics and engineering, but he never composed a Beethoven symphony or did a Rembrandt painting.

Briefly, creativity is a highly important human characteristic. As just indicated, it leads to inventing printing presses, light bulbs, cures for diseases, great symphonies, and solutions to public policy problems. It is something that we should be seeking to measure. The rest of the paper will give some ideas on how creativity may be

Related Concepts to Creativity

Knowledge, Skills, and Intelligence

A knowledge test might ask, "When did Columbus discover America?" or "How much is 2 plus 2?" More advanced knowledge tests can be developed. To validate a knowledge test, one can come up with a battery of many questions and give them to a random sample on adults or some other age group. If 100% get the right answer, then that is rather elementary knowledge. If 0% get the right answer, that is rather advanced or unknown knowledge. Each question can be given a score based on the percentage of those who know the right answer in order to have different degrees of difficulty.

Number involves a combination of 1 and 0 in order to make a ten. There is no symbol in the Arabic numbering system for a ten unlike the Roman numbering system in which an X represents a ten. In order to show that we are in the tens, we put a number in the second column. After explaining that to the test taker, he or she is then asked to develop combinations of numbers 0, 1, 2, and 3 for a numbering system that is based on four rather than ten. That means the number four is shown by writing a 10. Further explanation may be needed. The test taker is

then asked to write out (using the four-based numbering system) the corresponding numbers for 7, 11, 15, and 25. If the test taker gets all five correct, then he or she has demonstrated an ability to deal with number concepts that he is not likely to have mastered before. Thus this could be a better test of quantitative ability to learn than the traditional math-based quantitative tests.

Memory and Common Sense

Memory is closely related to ability to learn. One cannot learn anything of lasting value without being able to remember. Thus it may be difficult to devise a test that is solely for intelligence or ability to learn and not partly for memory. One can develop a memory test that is highly but not completely divorced from intelligence. Such a test would involve reading to the test taker a list of five unconnected words and then asking them to be repeated. Then try six words, seven, and so on. The test could also use numbers like five numbers, six, and so on. If the test taker can fairly consistently remember ten words or ten numbers, then that is good memory. There may be an unavoidable element of intelligence also present because the test taker may be quickly developing an acronym or a mnemonic.

Common sense is difficult to test for. If by common sense we mean common knowledge, then this is a knowledge test. If by common sense we mean ability to learn, then this is an intelligence test. Common sense may refer to something that is different from either knowledge or intelligence. The term is sometimes used to refer to practical knowledge, but that is getting at the subject matter. Knowing carpentry is practical knowledge, but is not considered common sense. If a person is shown a hammer, a screwdriver, some nails, and some screws (who has never seen them before), then it is common sense to figure out that the hammer is used with the nails and the screwdriver is used with the screws. It might however be difficult to find test takers who have never seen these tools. A good test distinguishes between levels of ability among test takers.

For a common sense test to be meaningful, it has to be separate from knowledge and intelligence. Perhaps such a test might involve a question like "If $A = B$ and $B = C$, then what does C equal?" If the test taker answers D or "I don't know," then he or she seems to lack common sense. If the test taker says, " C equals A ," then that shows moderate reasoning. If the test taker says, " C equals A , and C equals B ," then that shows even better reasoning. Common sense seems to involve ability to reason, but with regard to very simple matters, and not with regard to complicated syllogisms.

Personality and Motivation

If we are talking about psychological testing related to creativity, then we should also talk about personality and motivation. Those concepts may be even more closely related to creativity. Personality can be classified in a variety of ways. Perhaps the most relevant classification is whether one has a positive or "can-do personality", rather than a negative or "can't-do personality". When both kinds of people are faced with a situation calling for creativity, the "can-do personality" is more likely to succeed even if the two people are equal on relevant knowledge, skills, intelligence, memory, and common sense. This may be true even if the can't-do personality is mildly superior on those other characteristics. The area of creativity may be more subject to self-fulfilling prophecies than almost any subject about which one might predict the future.

Closely related to having a positive "can-do personality" is the personality characteristic of perseverance. It is quite possible that Thomas Edison was really not very creative when it came to inventing the light bulb. He had to experiment with approximately 700 different filaments, gases, and containers before he arrived at the right combination in which a tungsten filament was the key element. Perhaps ten years before, some unknown person was on the track of discovering the light bulb, but quit after the 600th trial or maybe after the tenth trial. That person might have discovered the light bulb on the 11th trial and thus he would have been in that sense more creative than Edison.

Another highly relevant personality characteristic is whether a person has a collaborative personality or an intellectually paranoid personality. Those are opposite extremes with degrees in between. The collaborative personality is like John Kennedy who worked well with others. He is given credit for being highly creative when much of his creativity was stimulated by working with others who are sometimes referred to as the best and the brightest. The intellectually paranoid personality is like Richard Nixon who preferred to be surrounded by yes-men who would not upstage him. As a result, he may have missed a lot of opportunities to be creative. Perhaps his greatest creativity was in the area of welfare reform where he was advised by Democrat Daniel Patrick Moynihan. Nixon abandoned him in order to appease southern senators into blocking Nixon's impeachment.

Maybe even more important than relevant personality characteristics is motivation, although many of these concepts overlap. Motivation in this context refers to being driven to find creative solutions to specific problems. Otherwise, things that one highly values will be lost. Edison did not highly value having light at night. He did highly value his ego. He would therefore artificially motivate himself by announcing a few months in advance that he would hold a press conference to demonstrate the light bulb which he had not yet invented. For the next few months, he would go with little sleep and much motivation to show light from a light bulb at midnight in the winter to a set of previously skeptical reporters, scientists, and other people whose respect Edison valued.

Motivation is a link between creativity and both Marx and Freud. Marxists might say that a society like Tsarist Russia with sharply divided economic classes of rich and poor is not so likely to be creative. Poor people are too busy struggling for food, shelter, and clothing. Rich people may be too satiated to be motivated to be creative. Karl Marx liked the U.S. and the Netherlands partly because they were relatively middle class societies with lots of upward mobility and thus more stimulating to creativity.

Freudians might say that creativity is partly due to a conscious or subconscious desire to impress members of the opposite sex or members of the same sex if that is one's sexual orientation. Thus, measuring sexuality could be considered as measuring a correlate or even a cause of creativity. This is not because estrogen or testosterone cause creativity. It is because if one is sexually dead, then one lacks the motivation to be creative in order to intellectually score.

Testing for Creativity

Creativity among Professors

Now we may be ready to talk about a test for creativity. One might say why did we waste time talking about these other concepts first? The answer is partly because these concepts are frequently confused with creativity and with each other. University professors may be highly knowledgeable, but only in their own fields. They may be highly intelligent, but not necessarily both verbal and quantitative. They may lack some skills like carpentry, sports, and social graces. They are reputed to lack streetwise common sense, whatever that is.

Professors are reputed to have lots of creativity, but that might be a bit questionable.

1. They tend to be creative only in their own field, and not necessarily have something that is called general creativity. General intelligence is both quantitative and verbal. General knowledge covers lots of subjects.
2. If creativity means to be usefully innovative, then a lot of professors who do a lot of publishing might find it difficult to say that their publishing is creative. Much of it may not be very useful for improving how things are done or even for improving our understanding of causation. Much of it is a demonstration of methodological elegance.
3. Their publications may not be very innovative either if much of it involves presenting the same ideas that have been repeatedly published, although with a slight variation. Is it innovative, for example, if the publication shows the correlation between the background characteristics of voters and whether they vote Democratic or Republican in Illinois in 1996, when we have seen that kind of research in numerous states, cities, years, and elections?
4. Only 5% of the faculty at even major universities are reputed to write 95% of the books. This is sometimes referred to as the Babe Ruth syndrome where there have to be numerous strikeouts to hit a home run. Likewise universities need to tolerate less productive faculty in order to have the more productive ones. It is difficult when hiring and even when giving tenure to know who the more productive or creative ones will be.

Measuring Creativity

Back to measuring creativity. One frequently suggested way is to show the test taker a Rohrsach inkblot and ask him or her what he sees. If the test taker says a butterfly, then this is considered not very creative. If the test taker says the inkblot is Ross Perot's ears that is more creative or more unusual. We could validate such a test by showing the same inkblot to 1,000 people. If the test taker says something that a high percentage also said, then this is not very creative. If, however, only 2% of the 1,000 say x, and the text taker says x, then that is creative. This is not a very good approach because people will quickly say wild things in order to appear to be creative, such as the inkblot looks like a rhinoceros dancing with a flea.

Perhaps the best way to measure creativity is not with any kind of a pencil-paper or interviewing test like a knowledge or intelligence test. Perhaps the best way is to ask the test taker what have you done that might be considered creative? Or what have you published, assuming publications indicate creativity, especially books. Or what have you composed, painted, sculptured, or otherwise designed for which there is a commercial market. Or what have you invented, discovered, or developed that might be considered innovatively useful. Questions like those might be much more meaningful in indicating a person's creativity.

There is considerable subjectivity in evaluating the answers. But the answers could be used to rank order people or to classify people as high, medium, or low even though such questions and answers would not be likely to generate a creativity quotient analogous to the traditional intelligence quotient.

A cynic, skeptic, or both might object on the grounds that such questions would not be meaningful to ask young people who have not yet established themselves. That seems to be a wrong response for two reasons. First, even five-year olds have probably done some creative things, although not necessarily at a Nobel Prize level. If five-year-olds can be creative then so can 25-year-olds. Second, if we wait until a person's lifetime has gone by to ask him or her what creative things they have done, by then the analysis may be too late to use for career counseling or for making hiring decisions.

Conclusions

If creativity means being usefully innovative in diverse situations, then a past performance test does seem to be the most meaningful test for creativity. Such a test is not mutually exclusive with a pencil/paper test that involves drawing pictures or interpreting inkblots. None of these tests or concepts are mutually exclusive. They all overlap to some extent, and they involve reciprocal causation. For example, being highly motivated may cause successful creativity, but successful creativity feeds back and reinforces one's motivation. We could draw a matrix with all the variables on the top and on the left side. In the cells, we could indicate how each concept overlaps or reciprocally causes each other concept.

A five-person evaluating committee might be likely to agree that a certain person's past performance is indicative of high creativity. But they may not be likely to agree that his picture drawing or inkblot interpreting is indicative of high creativity in the sense of being both innovative and broadly useful. Thus a good way to deal with developing creativity questions or tests (and a good way of interpreting the results) is by a committee using some method of averaging their opinions.

Creativity may be a bit like pornography was to Supreme Court Justice Potter Stewart. He said roughly, "I cannot measure pornography, but I know it when I see it, and I think it ought to be decreased." We may not be able to measure creativity, but we sort of know it when we see it, and it ought to be increased.

About the Author

Stuart Nagel is a professor emeritus of political science at the University of Illinois. He is also the coordinator of the Policy Studies Organization, the Dirksen-Stevenson Policy Institute, and the Miriam Mills Research Center. He is the author of such relevant books as *Creativity and Public Policy: Generating Super-Optimum Solutions* (Ashgate, 2000) and *Creativity: Being Usefully Innovative in Solving Diverse Problems* (Nova Science, 2000). He is also the editor of the quarterly journal called *Creativity Plus* and the coordinator of the *Creativity Plus Association*. His email address is s-nagel@uiuc.edu.