The Psychology of Simonton's Science

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Commentary on Simonton (2009)

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ABSTRACT—One key assumption of the psychology of science is that psychological factors make certain interests, talents, and abilities more likely and others less likely (Feist, 2006). The line of argument that Simonton (2009, this issue) puts forth—integrating and uniting the metaliteratures on dispositional and developmental influences on scientific and artistic creativity—is not only consistent with this assumption from the psychology of science, but it is also a breeding ground for a host of testable hypotheses and calls for future empirical investigations. Given Simonton's own extraordinary levels of scientific creativity, indeed it would be interesting to turn his ideas back on him to see how his science is a product of his own developmental and dispositional experiences. We'll leave that, however, for future biographers and psychologists of science.

Simonton has been so prolific, with more than 300 papers and 9 books to date, that it is a wonder that he can still surprise and impress with the novelty of his insight and contribution. Yet, he has both surprised and impressed me with this piece. He has long written about creativity in art and science from vast historical, geographical, and cultural perspectives (Simonton, 1975, 1984, 1992, 2000). Indeed, in one of his most recent pieces, he proposed a genetic model of scientific talent, integrating vast quantitative literatures on the personality and intellectual contributions to scientific talent (Simonton, 2008).

But in this current piece, Simonton (2009, this issue) is at his integrative and big-picture best. He not only scans and unites the metaliteratures on dispositional and developmental influences on creativity, but also the literatures on metascience and metahumanities. That is, he summarizes evidence for how the sciences can be quantitatively arranged hierarchically from “hard” (physics, chemistry) to “soft” (sociology), with biology and psychology occupying the middle ground of this hierarchical space. It is one thing to make such an argument intuitively and even pejoratively, as I once heard Karl Popper do in a lecture. Popper dismissed out of hand a question concerning Kuhn's philosophy of science by saying Kuhn was not a scientist, but a historian and, like all social scientists and humanists, he tried to climb the ladder of science by studying real science (i.e., physics). For this and other reasons, I have never liked the adjectives “hard” and “soft” when describing science. In fact, a moment's reflection makes clear that the subject matter of the social sciences is nearly infinitely more complex than the subject matter of the physical sciences. Atoms and molecules, as complex as they are, behave in ways that are orders of magnitude simpler than thoughts, feelings, ideas, and social structures. By this right, it is the social sciences that might deserve the label “hard.” The editors of *Scientific American* would seem to agree with me: “[Working biological and scientists] are the first to point out that

the natural universe, for all of its complexity, is easier to understand than the human being. If social science seems mushy, it is largely because the subject matter is so difficult.” (Editors, 2002, p. 8).

Simonton doesn't simply make an argument about hard and soft science, however—he backs it with data. In particular, he applies at least seven quantitative criteria to arrange sciences in a hierarchy, among them the early impact rates for scientists under 35, obsolescence rates, peer evaluation consensus, and theories-to-laws ratios. When examining physics, chemistry, biology, psychology, and sociology, for instance, there is a high degree of consistency in which disciplines are high or low on these criteria. Physics comes out on top, followed by chemistry. Biology and psychology are next, followed by sociology. Psychology, it should be noted, is closer to biology than sociology.

What is particularly interesting about Simonton's hierarchy is that it is also very consistent with the work of other scholars who have scientometrically mapped the sciences based on their similarity and on how much other sciences revolve around them (Boyack, Klavans, & Borner, 2005; Garfield, 1979). Boyack and colleagues, for instance, coded more than 1,000,000 journal articles from more than 7,000 science journals on their structural similarity and interconnectedness. Seven hub sciences emerged, meaning that they were core sciences around which other smaller ones revolved: mathematics, physics, chemistry, earth sciences, medicine, psychology, and the social sciences. Psychology was located between the social sciences and medicine.

One of Simonton's contributions in this article is his extrapolation of the hierarchy to encompass the arts and humanities by the same metrics applied to the sciences. For example, the speed at which knowledge becomes obsolete in a given field not only systematically covaries

with the hard and soft sciences, but it also separates the humanities from the social sciences to a similar degree as it separates the social sciences from the physical sciences.

To my way of thinking as well as my program of research, Simonton's piece has profound implications for the psychology of science. He lays out solid theoretical and empirical evidence for how dispositional and developmental factors influence the path one chooses in science. More specifically, "normal" (in the Kuhnian sense) scientists and artists choose areas of science and art consistent with their dispositional and developmental experiences, whereas "revolutionary" scientists and artists choose areas with dispositional and developmental experiences lower in the hierarchy. That is, the most creative contributors in science and art consistently come from households with a bit more conflict and turmoil and are more prone to looseness of associations and some degree of psychopathology than their less creative peers.

One key assumption of the psychology of science is that psychological factors make certain interests, talents, and abilities more likely and others less likely (Feist, 2006). The line of argument that Simonton puts forth is not only consistent with this assumption from the psychology of science, but it is also a breeding ground for a host of testable hypotheses and calls for empirical investigations.

Simonton summarizes Ludwig's (1998) four levels of magnification—for example, scientists have lower lifetime rates of mental illness than artists and the natural sciences have lower rates of mental illness than the social scientists. Simonton goes one step further, however, and uses the hierarchy to propose three testable models of how disposition and development might match with creators in different disciplines. First, the so-called centroid model proposes that creators are lined up with the center of their disciplines' dispositional and developmental profile. Second, the domain-progressive creator model predicts that creators may be lined up

with dispositional and developmental profiles one or more steps higher in the hierarchy. And thirdly, the domain-regressive creator model proposes that the most creative people are lined up with profiles one or more steps below their own disciplines in the hierarchy. By proposing and testing multiple models, Simonton is using strong inference to choose between models (Platt, 1964). Simonton concludes the model most consistent with the data and evidence is the domain regressive model. Creators have psychological profiles more similar to individuals below rather than at or above their disciplinary hierarchy.

Simonton's own prolific productivity is an instantiation of an important principle of creativity: fluency of ideas is at the cornerstone of creative thought and behavior. He has so many ideas that it will take the rest of us a while just to come up with ways to either empirically test them or develop our own ideas in response to them. His current article is one of these thought-provoking and stimulating pieces. Both the psychology of creativity and the psychology of science are richer and they have their work cut out for them thanks to Simonton's integrative and creative contributions. Indeed, as a psychologist of science, I can't help but end with a playful speculation: It would be interesting to turn Simonton's ideas back on him to see how his science is a product of his own developmental and dispositional experiences. Given his level of creativity and his own findings, I would predict his profile might line up with those lower in the disciplinary hierarchy, such as literature or art.

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