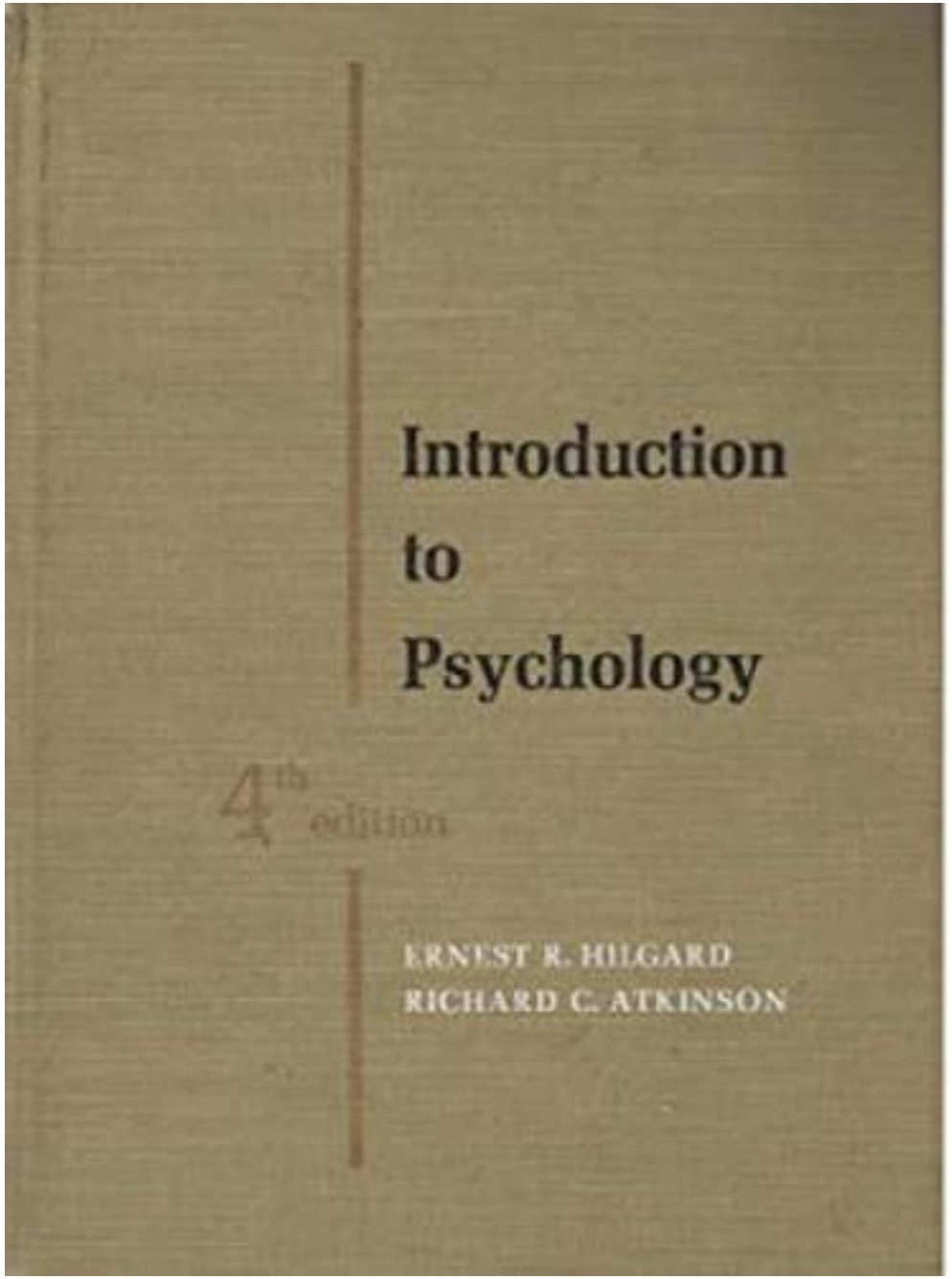
From Hilgard & Atkinson (1967) to Hilgard 2023

How an Intro Text Helped Stimulate over 50 Years of Research



An aside: Although I never met Hilgard, Atkinson was President of the University of California from 1995-2003, when I was Full Professor at UC Davis, and he attended the gala where I received the (then) $25,000 UC Davis Prize for Teaching and Scholarly Achievement, where I met him in the receiving line black-tie-and-all !

TABLE 4–8

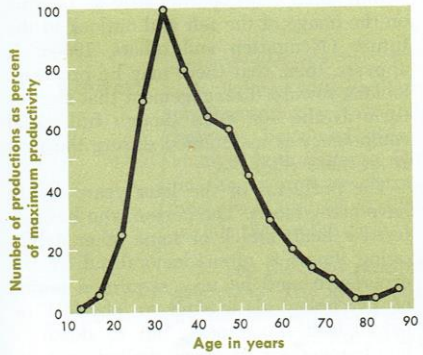
Age of maximum rate of very superior contributions

General field of creative work	*Age at time of maximum rate of contribution*			
	25-30	30-35	35-40	40-45
Physical sciences, mathematics, inventions	Chemistry	Mathematics Physics Electronics Practical inventions Surgical techniques	Geology Astronomy	
Biological sciences and medicine		Botany Classical descriptions of disease	Bacteriology Physiology Pathology Medical discoveries	
		Genetics Entomology Psychology		
Philosophy, education, and social sciences		Economics and political science		
			Logic Ethics Esthetics "General philosophy" Educational theory and practice	Metaphysics
			Social philosophy	
Musical compositions	Instrumental selections	Vocal solos Symphonies	Chamber music Nonsymphonic orchestral music Grand opera	Cantatas Light opera and musical comedy
Literary compositions	Lyrics and ballads (German) Odes Elegies Pastoral poetry Narrative poetry Sonnets Lyric poetry	Satiric poetry Short stories Religious poetry (hymns) Comedies	Tragedies "Most influential books" Hymns by women	Novels "Best books" Best sellers Miscellaneous prose writings
Painting and sculpture		Oil paintings	American sculpture	Modern architecture Oil paintings (contemporary artists)

SOURCE: Lehman, 1953.

4–13

Age at which superior works were produced



Ages at which 933 scientists, mathematicians, and inventors produced 1359 superior contributions. (After Lehman, 1953)

other fields as well (e.g., music, general books, linguistics), between one-third and two-thirds of the material is produced by only 10 percent of those active in the respective field (Dennis, 1955). These data raise fascinating but elusive problems. Do very productive people have a better chance to hit upon something important? Do people who happen to attract prominence early become motivated to remain productive? Further research is needed to obtain answers to these questions. We do know that people who are productive early are more likely than the less productive to continue to create in their later years. This is true whether or not they attain eminence (Dennis, 1954*a*, *b*).

There are two major lessons to be learned from this massive data on the productivity of creative persons. The first is that the early adult years are important ones, and that it would probably be a good idea to place able people on their own at the youngest feasible age. The second is that some means should be found for continuing the creativity of those who show early promise. Equally impressive as the early age of major contributions is the very rapid fall-off in contributions, beginning, as shown in Figure 4–13, immediately beyond the high peak in the early 30s. It may be that society's rewards for early success are antithetical to creative work: shifting to "better" jobs with loss of continuity of effort, taking on administrative duties, excessive demands for lecturing at a distance from the workbench; one observer after a study done many years ago felt that in his field (history) it appeared that historians of promise were being paid *not* to do research (Jernegan, 1927).

CRITICAL DISCUSSION

Life-history data vs. laboratory data; advantages and hazards

The work of both Lehman and Dennis calls attention to the possibility of using existing historical data for quantitative purposes. Hypotheses can be tested with such data as well as with data freshly gathered in the laboratory and (as in these studies) can provide information that could not be obtained in the laboratory. Historical data have other advantages over laboratory data, in that the people studied represent an ability level that could not be matched in the laboratory and are more highly motivated in their work than laboratory subjects generally are. The laboratory has the advantage of more stringent control, but the disadvantage of more restricted subjects.

Dennis (1958) points out certain hazards in the use of historical data. He has argued that one reason Lehman's scientists seem more eminent when they are younger than when they are older is that the number of scientists increases very rapidly, so that on the basis of numbers alone scientists are losing their competitive advantage. That is, if the same famous man had been a young man 25 years later, his chances of fame, with the same amount of creativity, would have been much less. Perhaps Lehman has been plotting an increase in competition rather than a decrease in productivity with age. This is an interesting point, but Lehman (1960) appears to have shown that the amount of this effect as a distortion of his findings would not be very great.

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Empirical Studies

2. Simonton, D. K. (1975a). Age and literary creativity: A cross-cultural and transhistorical survey. *Journal of Cross-Cultural Psychology, 6,* 259-277.

15. Simonton, D. K. (1977a). Creative productivity, age, and stress: A biographical time-series analysis of 10 classical composers. *Journal of Personality and Social Psychology*, *35*, 791-804.

106. Simonton, D. K. (1991c). Emergence and realization of genius: The lives and works of 120 classical composers. *Journal of Personality and Social Psychology*, *61*, 829-840.

210. Simonton, D. K. (2000c). Creative development as acquired expertise: Theoretical issues and an empirical test. *Developmental Review*, *20*, 283-318.

310. Simonton, D. K. (2007d). Cinema composers: Career trajectories for creative productivity in film music. *Psychology of Aesthetics, Creativity, and the Arts*, *1*, 160-169.

312. Simonton, D. K. (2007f). Creative life cycles in literature: Poets versus novelists or conceptualists versus experimentalists? *Psychology of Aesthetics, Creativity, and the Arts*, *1*, 133-139.

496. Simonton, D. K. (2015n). Thomas Alva Edison's creative career: The multilayered trajectory of trials, errors, failures, and triumphs. *Psychology of Aesthetics, Creativity, and the Arts*, *9*, 25-34.

Review Articles

81. Simonton, D. K. (1988a). Age and outstanding achievement: What do we know after a century of research? *Psychological Bulletin, 104,* 251-267.

Theoretical Papers

44. Simonton, D. K. (1984b). Creative productivity and age: A mathematical model based on a two-step cognitive process. *Developmental Review, 4,* 77-111.

104. Simonton, D. K. (1991a). Career landmarks in science: Individual differences and interdisciplinary contrasts. *Developmental Psychology, 27,* 119-130.

164. Simonton, D. K. (1997c). Creative productivity: A predictive and explanatory model of career trajectories and landmarks. *Psychological Review*, *104*, 66-89.

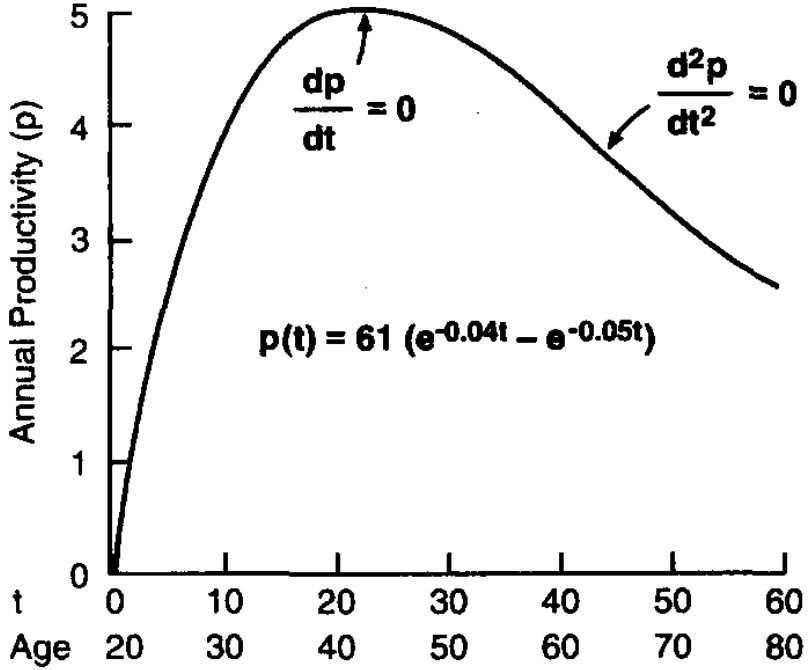


Figure 1. The predicted relation between career age, t, and annual production of creative ideas, $p(t)$, according to the longitudinal model, where e is the exponential constant, the ideation rate $a = .04$, the elaboration rate $b = .05$, and the initial creative potential $m = 305$, and hence $c = 61 = (.04)(.05)(305)/(.05 - .04)$. The relation is expressed as a function of career age t, where the career onset $t = 0$ occurs at age 20. The peak occurs where the first derivative $dp/dt = 0$ and the inflection point where the second derivative $d^2p/dt^2 = 0$. (Adapted from "Creative Productivity and Age: A Mathematical Model Based on a Two-Step Cognitive Process," by D. K. Simonton, 1984, *Developmental Review, 4,* p. 86. Copyright 1984 by the Academic Press. Adapted with permission.

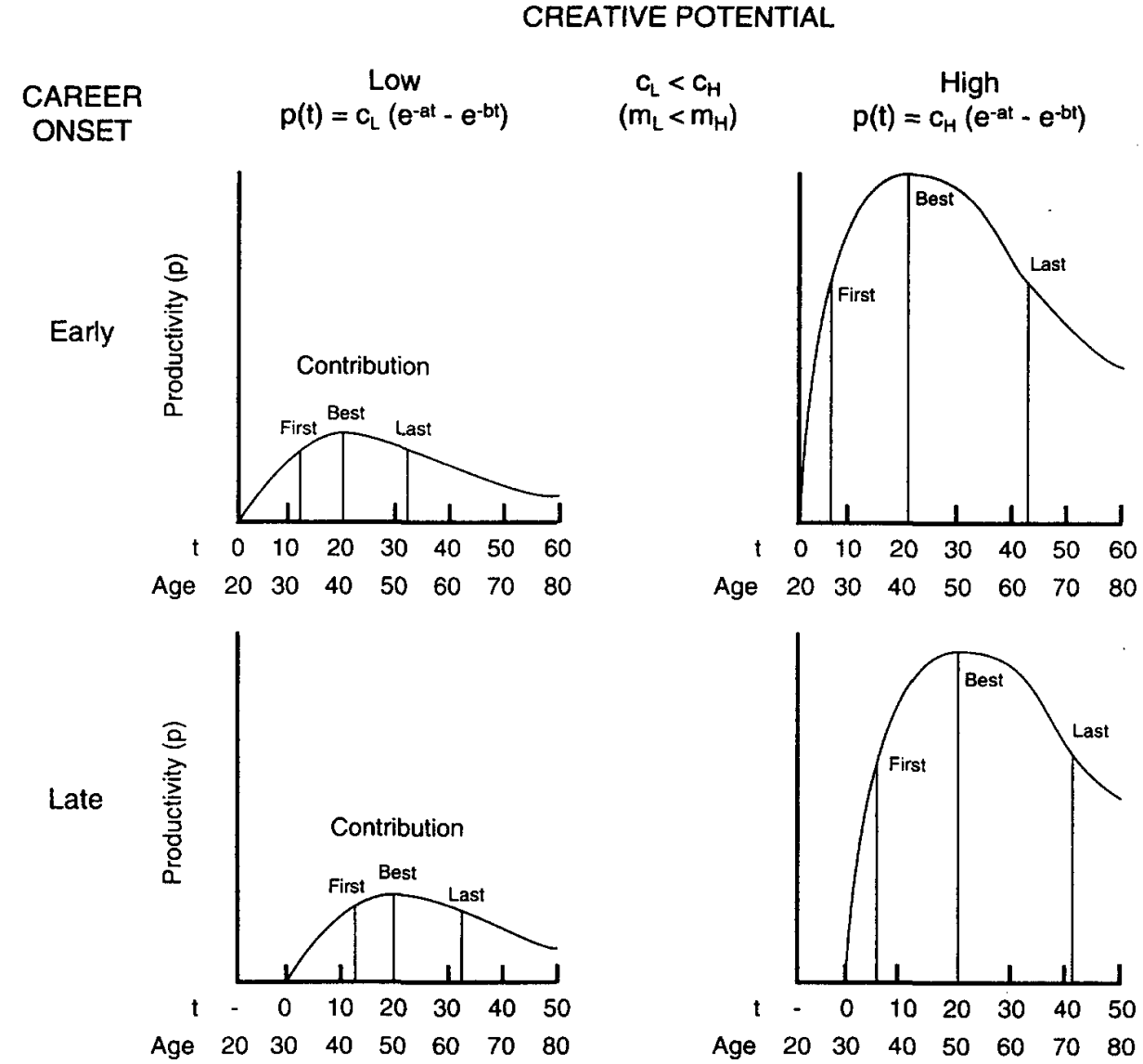


Figure 5. Typology of career trajectories according to early or late career onset ($t = 0$ at age 20 versus age 30) and low or high initial creative potential (m_L versus m_H, hence yielding different coefficients c_L versus c_H, respectively). As in Figure 1, a is the ideation rate, b is the elaboration rate, and e is the exponential constant. Adapted from "Career Landmarks in Science: Individual Differences and Interdisciplinary Contrasts" by D. K. Simonton, 1991, *Developmental Psychology, 27,* p. 121. Copyright 1991 by the American Psychological Association.

Psychological Review
1997, Vol. 104, No. 1, 66–89

0033-295X/97/$3.00

Creative Productivity: A Predictive and Explanatory Model of Career Trajectories and Landmarks

Dean Keith Simonton
University of California, Davis

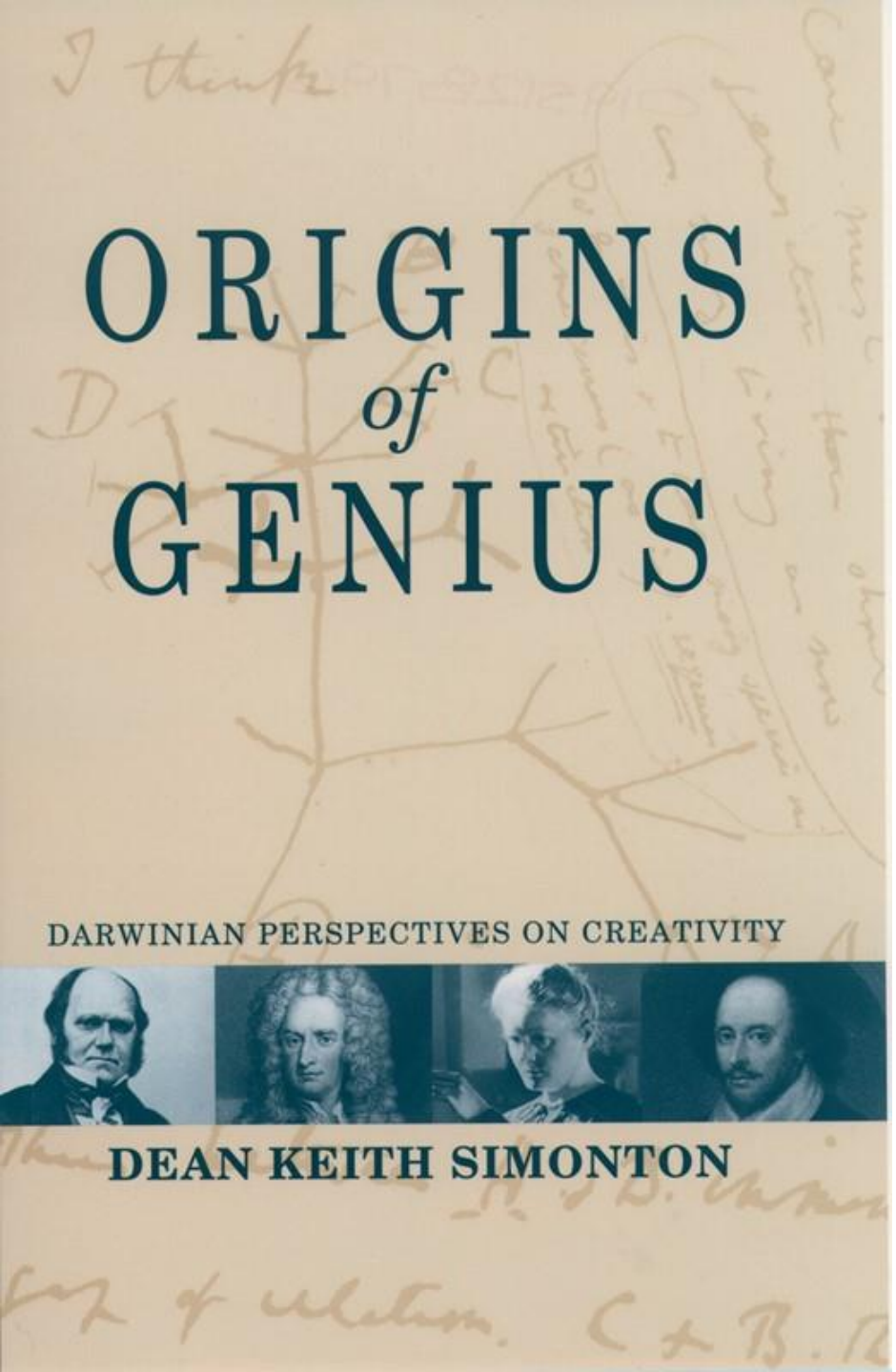
The author develops a model that explains and predicts both longitudinal and cross-sectional variation in the output of major and minor creative products. The model first yields a mathematical equation that accounts for the empirical age curves, including contrasts across creative domains in the expected career trajectories. The model is then extended to account for individual differences in career trajectories, such as the longitudinal stability of cross-sectional variation and the differential placement of career landmarks (the ages at first, best, and last contribution). The theory is parsimonious in that it requires only two individual difference parameters (initial creative potential and age at career onset) and two information-processing parameters (ideation and elaboration rates), plus a single principle (the equal-odds rule), to derive several precise predictions that cannot be generated by any alternative theory.

Albert Einstein had around 248 publications to his credit, Charles Darwin had 119, and Sigmund Freud had 330, while Thomas Edison held 1,093 patents—still the record granted to any one person by the U.S. Patent Office. Similarly, Pablo Picasso executed more than 20,000 paintings, drawings, and pieces of sculpture, while Johann Sebastian Bach composed

duction of his opera *Cavalleria Rusticana*, but his career thereafter underwent a precipitous decline. On the other hand, Anton Bruckner typifies the "late bloomer." He did not discover his mission as a symphonic composer until he was 39 years old and so produced his first genuine masterwork at age 50. He was still working on his last great symphony when death ended his

But what was the theoretical basis for the above mathematical model?

- Hilgard & Atkinson (1967) devoted several pages to creativity (pp. 385-391), but this overview seemed a mish-mash of diverse and unconnected theories and findings – no conceptual coherence!
- Yet when I was a Harvard graduate student, my mentor became David Kenny (2019 APA DSC Award), whose own mentor, Donald Campbell (1970 APA DSC Award), had written:
  - Campbell, D. T. (1960). Blind variation and selective retention in creative thought as in other knowledge processes. *Psychological Review*, *67*, 380-400.
- This not only connected creativity with evolutionary epistemology, but also provided the foundation for understanding the cognitive, individual-differences, life-span developmental, and sociocultural aspects of the phenomenon, eventually synthesized as …



Contents

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7 Darwinian Genius

William James Book Award, Society for General Psychology, Division 1 APA (2000)

Awards predicted long-term citation impact!

- The 1997 Miller award-winning article became my second most cited journal article, whether empirical, theoretical, or otherwise
- The 2000 James award-winning book became my single most cited publication of any kind, whether article, chapter, or book
- Hence, given that the former was published in 1997 and the latter was published in 1999, the two Division One award committees were amazingly prescient, predicting what would be considered my most impactful publications decades in advance!
- And they can't be blamed for missing my most cited article because it was published in 2003, namely
  - **261**. Simonton, D. K. (2003o). Scientific creativity as constrained stochastic behavior: The integration of product, process, and person perspectives. *Psychological Bulletin*, *129*, 475-494. (which won the *Theoretical Innovation Prize*, Society for Personality and Social Psychology, Division 8 APA 2004)

Nor does this exhaust the impact that Hilgard & Atkinson exerted on my research

- The text also discusses intelligence, including Lewis Terman's classic *Genetic Studies of Genius*, leading me to ask …
  - What is the precise functional relation between general intelligence and exceptional personal influence in groups? Nonlinear? Nonmonotonic?
    - Theoretical answer:
      - **58**. Simonton, D. K. (1985c). Intelligence and personal influence in groups: Four nonlinear models. *Psychological Review*, *92*, 532-547. (received 1st *Mensa Award for Excellence in Research*, Mensa Education & Research Foundation 1986)
    - Empirical test:
      - **514**. Antonakis, J., House, R. J., & Simonton, D. K. (2017). Can super smart leaders suffer too much from a good thing? The curvilinear effect of intelligence on perceived leadership behavior. *Journal of Applied Psychology, 102*, 1003-1021.
      - Yep – peak at 1.2 SD exactly as predicted!

Nor does this exhaust the impact that Hilgard & Atkinson exerted even if more indirectly

- Later reading Terman's *Genetic Studies of Genius* I discovered that its Volume II was not discussed in the intro text, namely
  - Cox, C. (1926). *The early mental traits of three hundred geniuses*. Stanford, CA: Stanford University Press.
  - Here "life-history" methods are used to assess historic creators and leaders on intelligence (aka "IQ"), personality, and achieved eminence
- This pioneering "historiometric" inquiry inspired two lines of research assessing the intelligence-achievement relation:
  - Intelligence as inferred from intellectual development
  - Intelligence as inferred from observer-based personality assessments

Intelligence as inferred from intellectual development

- **8**. Simonton, D. K. (1976a). Biographical determinants of achieved eminence: A multivariate approach to the Cox data. *Journal of Personality and Social Psychology, 33*, 218-226.
- **332**. Simonton, D. K. (2008b). Childhood giftedness and adulthood genius: A historiometric analysis of 291 eminent African Americans. *Gifted Child Quarterly*, *52*, 243-255. (received 2nd *Mensa Award for Excellence in Research*, Mensa Education & Research Foundation and Mensa International, Ltd. 2009)
- **354**. Simonton, D. K., & Song, A. V. (2009). Eminence, IQ, physical and mental health, and achievement domain: Cox's 282 geniuses revisited. *Psychological Science*, *20*, 429-434. (received 3rd *Mensa Award for Excellence in Research*, Mensa Education & Research Foundation and Mensa International, Ltd. (with A. V. Song; 2011))

Intelligence as inferred from observer-based personality assessments

- **41**. Simonton, D. K. (1983d). Intergenerational transfer of individual differences in hereditary monarchs: Genes, role-modeling, cohort, or sociocultural effects? *Journal of Personality and Social Psychology, 44,* 354-364.
- **50**. Simonton, D. K. (1984h). Leaders as eponyms: Individual and situational determinants of monarchal eminence. *Journal of Personality, 52,* 1-21.
- **71**. Simonton, D. K. (1986k). Presidential personality: Biographical use of the Gough Adjective Check List. *Journal of Personality and Social Psychology*, *51*, 149-160.
- **303**. Simonton, D. K. (2006k). Presidential IQ, Openness, Intellectual Brilliance, and leadership: Estimates and correlations for 42 US chief executives. *Political Psychology*, *27*, 511-639.

Other relevant Terman-Cox inspired publications

- **364**. Simonton, D. K. (2009t). The "other IQ": Historiometric assessments of intelligence and related constructs. *Review of General Psychology, 13*, 315-326.
- **565**. Simonton, D. K. (2020d). Galton, Terman, Cox: The distinctive Volume II in *Genetic Studies of Genius*. *Gifted Child Quarterly, 64*, 275-284.

N.B.: This work on the intelligence-achievement relationship is the basis for the *Mensa Lifetime Achievement Award*, "for contributions to the field of human intelligence," Mensa Foundation 2019)

But big question: Has my whole half century of research built exclusively on a lower-division undergraduate textbook?

No! Award-winning research tracks that were NOT inspired by Hilgard & Atkinson (1967)

- Computer content analyses of classic music and Shakespeare's plays and sonnets (*Rudolf Arnheim Award for Outstanding Achievement*, Society for the Psychology of Aesthetics, Creativity and the Arts, Division 10 APA 1996)
- Cinematic creativity and aesthetics (*Distinguished Scientific Contributions to Media Psychology Award*, Society for Media Psychology and Technology, Division 46 APA 2013)
- Quantitative and qualitative single-case studies of historic creators and leaders (*Henry A. Murray Award*, Association for Research in Personality and the Society for Personology 2014)

Award-winning research tracks that were NOT inspired by Hilgard & Atkinson (1967)(cont.)

- Nature and nurture in talent development (from genetic endowment to diversifying experiences) (*E. Paul Torrance Award*, National Association for Gifted Children 2010; *Esther Katz Rosen Fund Lecture on Gifted Children and Adolescents*, American Psychological Foundation (APF) 1994)
- An eightfold response typology: Creativity, automaticity, irrationality, fortuity, fantasy, and other contingencies (*Arthur W. Staats Lecture for Unifying Psychology*, APF 2017)
- Metascience of psychology: its historical, sociological, psychological, and philosophical context (*Joseph B. Gittler Award,* APF 2013)
- Sociocultural context of historic creativity in Western, Islamic, Chinese, and Japanese civilizations (*Otto Klineberg Intercultural and International Relations Honorable Mention*, Society for the Psychological Study of Social Issues, Division 9 APA 1997)

But still …
Thank you, Hilgard & Atkinson (1967)
for your contribution to my 2023
Hilgard