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LATE BLOOMERS IN THE ARTS AND SCIENCES: ANSWERS AND QUESTIONS

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ABSTRACT

Recent research has shown that all the arts have had important practitioners of two different types — conceptual innovators who make their greatest contributions early in their careers, and experimental innovators who produce their greatest work later in their lives. This contradicts a persistent but mistaken belief that artistic creativity has been dominated by the young. We do not yet have systematic studies of the relative importance of conceptual and experimental innovators in the sciences. But in the absence of such studies, it may be damaging for economic growth to continue to assume that innovations in science are made only by the young.

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Introduction

In today's hyperkinetic world of instant internet links and urgent television sound bites, we have become conditioned, almost brainwashed, to believe that the innovative people who make important contributions to our arts and sciences are all whiz kids, prodigies fresh from the most prestigious art schools and institutes of technology, who leap boldly to sudden, dramatic discoveries. In fact, however, these young geniuses may be matched in both number and importance by much less conspicuous late bloomers, who spend most or all of their lives working patiently and tirelessly in obscurity, only gradually arriving at the achievements that ultimately gain them recognition. Failure to recognize the importance of these late bloomers may not only harm their careers, but may reduce the rate of innovation in our arts and sciences.

Late Bloomers in the Arts

Robert Frost spent decades refining a poetic style intended to capture the elusive effect he called the "sound of sense."[1] Another great New England poet, Robert Lowell, wrote of Frost that "Step by step, he had tested his observation of places and people until his best poems had the human and seen richness of great novels."[2] Frost had no doubt not only that his own poetry had improved over time, but that in general the greatest poetry was produced by older artists. Thus at the age of 63, he wrote that "Young people have insight. They have a flash here and a flash there. It is like the stars coming out in the early evening. They have flashes of light. It is later in the dark of life that you see forms, constellations. And it is the constellations that are philosophy . . . I suppose that poets die into philosophy as they grow older — if they don't die the other way. They die into wisdom."[3] For Frost, wisdom was the highest value. In perhaps his most celebrated description of artistic creativity, he wrote that the poem "begins in delight and ends in wisdom . . .

It finds its own name as it goes and discovers the best waiting for it in some final phrase at once wise and sad."[4]

Frost would probably have been greatly amused by the recent confident declaration of a young writer named Jonah Lehrer that poetry is one of several disciplines that "have always been dominated by their most inexperienced practitioners."[5] Frost wrote his most frequently anthologized poem, "Stopping by Woods on a Snowy Evening," at the age of 48. The timing of this great poem was not an anomaly within Frost's career. So for example the five years in which he executed the work that has been most frequently anthologized occurred at the ages of 42, 49, 54, 62, and 68.[6] Nor was Frost's life cycle of creativity anomalous among great modern American poets: like Frost, Wallace Stevens, William Carlos Williams, Elizabeth Bishop, and Robert Lowell all wrote the poems that account for at least 60% of their total anthology entries after the age of 40.[7]

Frost, Stevens, Williams, Bishop, and Lowell are all important examples of *experimental* innovators: poets who work tentatively by trial-and-error, seeking to make discoveries in the process of working that allows them to represent their perceptions of reality. Experimental innovators tend to be late bloomers, because both their understanding of their subject and their technical mastery generally grow over long periods of study and practice. So for example in 1915, when Frost was 41, the poet William Braithwaite observed that "Mr. Frost has been through the longest period of experimentation in mastering the technique of his art of any other American poet," and five decades later the poet Randall Jarrell praised Frost for "the many, many poems in which there are real people with their real speech and real thought and real emotions," reflecting that "When you know Frost's poems, you know surprisingly well what the world seemed to one man."[8]

In contrast, T.S. Eliot, Ezra Pound, e.e. cummings, Richard Wilbur, and Sylvia Plath were important *conceptual* innovators. Their art was not intended to describe or represent external reality, but to express their own ideas and emotions, with frequent recourse to imagination and exaggeration. So for example in a foreword to *Ariel*, a posthumous collection of Plath's last poems, Lowell wrote of his former student's work that "Everything in these poems is personal, confessional, felt, but the manner of feeling is controlled hallucination, the autobiography of a fever."[9] With the certainty that often characterizes conceptual artists, while she was writing those late poems Plath declared in a letter to her mother, "I am a genius of a writer . . . I am writing the best poems of my life; they will make my name."[10] Conceptual innovators are art's precocious and iconoclastic young geniuses; they tend to make their major contributions early in their careers, when they are at their most intense and uninhibited, and are able to make radical departures from established conventions without the constraint of fixed habits of thought. So for example Eliot wrote his most frequently anthologized poem, "The Love Song of J. Alfred Prufrock," at 23, and Plath created the oeuvre that made her a major poet before committing suicide at the age of 30. Eliot, Pound, cummings, and Wilbur all wrote the poems that account for more than half of their total anthology entries before the age of 40; for Eliot and Pound, the relevant figures are 73% and 85%, respectively.[11]

The sudden and often spectacular breakthroughs of brilliant artists at very early ages have frequently made conceptual innovators overshadow their less dramatic experimental counterparts in the popular imagination: thus the poet Josephine Jacobsen observed that "in our general conception, old age is a period alien, if not fatal, to poetry. The Shelley-Keats image, the youthful figure of the runner fame never outran, lingers."[12] One might have hoped that quantitative scholarship would achieve greater balance. Unfortunately, however, since the

seminal empirical study of 1953 by Harvey Lehman, *Age and Achievement*, psychologists have consistently committed the regrettable practice of aggregating all poets into undifferentiated statistical distributions. So for example Lehman presented a single distribution of "age versus the production of 113 superior lyric poems by 41 poets," and summarized this and several other distributions with reference to a single central tendency, noting that "poems of greatest merit are most likely to be written from 23 to 29."[13] Lehman made no mention of the variance of the distribution, or of the intriguing fact that the distribution displayed a clear secondary peak after age 80.

Lehman's failure to examine qualitatively the nature of the work of the poets he studied meant that he saw no reason to disaggregate the data he had collected. He therefore failed to discover that there were two very different types of lyric poet included in his single distribution, who wrote poems for very different purposes, and that the two types of poet followed very different life cycles of creativity. Nor did his successors in psychology correct his error. Instead, a series of prominent psychologists have echoed the result of Lehman's aggregate analysis. So for example Howard Gardner wrote in 1993 that "lyric poetry is a domain where talent is discovered early, burns brightly, and then peters out at an early age. There are few exceptions to this meteoric pattern." Mihaly Csikszentmihalyi wrote in 1996: "The most creative lyric verse is believed to be that written by the young." Even more simply, James Kaufman declared in 2004 that "Poets peak young."[14] And so on, down to the most recent echo of Lehman in Lehrer's confident assertion that poetry is among the disciplines that "have always been dominated by their most inexperienced practitioners."

Determining the precise relative importance of experimental and conceptual innovators in poetry would require complex and extensive quantitative analysis. It would not only require

judging how many poets should be considered significant contributors to their discipline, but it would also have to allow for possible variation over time in the relative numbers of practitioners of the two types — not only over long periods, as from one century to the next, but also over shorter ones, from one cohort to the next. Time-series analysis of this kind has not been done. Nor would it appear to be a high priority. What matters more for our understanding of a discipline is an awareness of whether both types of innovator play a significant role. In the case of modern American poetry, it is clear that late bloomers, including Frost, Stevens, Williams, Bishop and Lowell, must be prominent among any enumeration of the most influential figures. Their importance is sufficient to invalidate the statements of Gardner and the other psychologists quoted above: poetry is not dominated by the young or inexperienced. Conceptual poets tend to peak young, but experimental poets do not.

What makes this conclusion important not only to students of poetry, but to our society at large, is that the division between experimental late bloomers and conceptual young geniuses exists in many other intellectual activities. We are not yet sure how far this extends, but every artistic discipline I have studied to date includes important innovators of both types. So for example whereas Pablo Picasso, the greatest painter of the twentieth century, was a conceptual young genius who produced his greatest masterpiece at 26, his predecessor Paul Cézanne, the greatest painter of the late nineteenth century, created his most important art at the end of his life, at 67.[15] The conceptual novelist Ernest Hemingway published his greatest novel, *A Farewell to Arms*, at 30, but his experimental predecessor Mark Twain published *Adventures of Huckleberry Finn*, which Hemingway described as the source of all modern American literature, at 50.[16] The conceptual Orson Welles made his revolutionary film *Citizen Kane* at 26, but the experimental Alfred Hitchcock directed his masterpiece, *Vertigo*, at 59.[17] The conceptual sculptor Robert

Smithson created *Spiral Jetty*, the most important individual work ever created by an American artist, at 32, but the experimental Auguste Rodin, the greatest modern sculptor, executed his masterpiece, *Monument to Balzac*, at 59.[18] The conceptual architect Maya Lin designed her most important work, the Vietnam Veterans Memorial, at the age of 21, but the experimental Le Corbusier designed the greatest building of the twentieth century, Notre Dame du Haut at Ronchamp, when he was 63.[19] The conceptual Cindy Sherman, perhaps the most important visual artist working today, made her most important photograph when she was 24, but the experimental Alfred Stieglitz, the greatest photographer of the twentieth century, made his most important image at 43.[20] The conceptual Bob Dylan revolutionized popular music with "Like a Rolling Stone" when he was 24, but the experimental Irving Berlin wrote his masterpiece, "White Christmas," at the age of 54.[21]

The examples cited above could be multiplied, but this is unnecessary. Each of these arts has two different kinds of innovators, who think and work in different ways. Conceptual innovators are theorists, whose talent is for abstraction. They work deductively, and solve precise problems by creating new syntheses of old ideas. In contrast, experimental innovators are empiricists, whose talent is for the real and concrete. They work inductively, gradually accumulating the wisdom and judgment with which they approach their less clearly perceived goals.

The relative importance of experimental and conceptual innovators in each of these arts is difficult to determine with precision, for the same reasons noted above with respect to poetry. But the existence of obviously important innovators of both types argues strongly against summary statements about any of these arts that consider only the central tendency of a single aggregated distribution, as Lehman and later psychologists have consistently done not only for

these arts, but for nearly all intellectual activities. If the ages at which the greatest practitioners of a discipline create their greatest innovations yield a bimodal distribution, it is at best misleading to refer to a single peak or prime age for the entire field. One danger is that this can spawn facile explanations. So for example Lehrer explained that the preeminence of young poets was "caused by intrinsic features" of the art: "Because the essential facts can be quickly learned, and it usually doesn't take that long to write a lyric poem, the precocious student is free to begin innovating at an early age."[22] Robert Frost didn't take long to write his poems; he liked to write them in one or two sittings. But study of his life's works demonstrates clearly that the greatness of his late poetry was a product of decades of experience — as he put it, "this isn't just amateur apprentice work that I've been writing."[23]

Errors like those of the psychologists quoted above are unfortunate, for they lead to misunderstandings of the nature of the arts. These errors are often of only academic interest. Yet the failure to recognize the existence of late bloomers as well as young geniuses may take on more practical significance if it becomes the basis for awards or institutions intended to foster creativity in the arts. So for example the Turner Prize, Great Britain's most prestigious award for visual art, has been given exclusively to conceptual artists since 1990, when it became officially restricted to artists under the age of 50.[24] The enormous publicity attendant on each year's competition has gained great attention for conceptual art, at the same time that it has reinforced the widespread assumption that artistic creativity is the exclusive domain of the young. Unfortunately overlooked in public debates has been the fact that J.M.W. Turner, whose name the prize bears, was a great experimental painter who produced his greatest masterpieces in his late 60s, and even more unfortunately, no comparable award has been established for older artists, to encourage experimental innovators.[25]

Late Bloomers in the Sciences

There has been no systematic study of the careers of experimental and conceptual innovators in the sciences. The archetypal cases of the inductive, empirical Charles Darwin, who published the first edition of *On the Origin of Species by Natural Selection* at the age of 50, and the deductive, theoretical Albert Einstein, who published the revolutionary Annus Mirabilis papers at the age of 26, clearly demonstrate that both types are represented among the very greatest modern scientists, but we do not know the relative number or relative importance of the two types.[26]

A persistent problem, with considerable practical importance, is a general lack of awareness of the existence of the two types of scholars among scientific innovators. Even some individuals who spend much of their time thinking about how to increase rates of scientific innovation appear to believe that the young are simply more creative. Thus Lehrer quoted Francis Collins, director of the National Institutes of Health, declaring that "One thing I've learned from being in science is that the researchers in the early stages of their careers tend to be the ones with the fire in the belly. They're not afraid of tackling the really hard problems."[27] The economist Paul Romer agreed: "Young people, I think, tend to be more innovative, more willing to take risks, more willing to do things differently, and they may be very important, disproportionately important, in this innovation and growth process."[28] Hence Romer's fear for "growth and change" if "old guys control more and more of what is going on."[29] Lehrer wrote that "By the time scientists are eminent and well-funded — this tends to happen in the final years of their careers — they are probably long past their creative prime."[30] This is more likely to be true for conceptual innovators than for their experimental counterparts. Recognizing the difference between the two life cycles may be the key to maximizing the effectiveness of research funding.

Conceptual innovators tend to be most innovative early in their careers. To maximize their potential, it is consequently valuable to identify them as early as possible, and to support them early with research grants and other means. It is therefore likely that overall innovative activity would increase if the NIH and other agencies shifted research funds from middle-aged and older scientists — particularly conceptual innovators who are past their creative peaks — to younger ones.

But this is not the only change that is likely to be desirable. Experimental innovators develop more slowly, and tend to be most innovative later in their careers. To maximize their potential, it is valuable to foster their extended development, and to support them with research grants and other means during their most innovative, later years. It is therefore likely that overall innovative activity would increase if NIH and other agencies also shifted research funds from middle-aged and older scientists — particularly conceptual innovators who are past their peaks — to older, experimental scholars.

Francis Collins and Paul Romer do not appear to recognize that their concern with shifting research funds exclusively toward younger scientists may be based on a half-truth — the half-truth stated by Lehrer, that "Youth and creativity have long been interwoven."[31] We do not know how many older, experimental innovators are currently being overlooked by funding agencies in the sciences. But we may never know if we continue simply to assume that scientific creativity is the exclusive domain of youth. Lehrer, Collins, and Romer are unaware that the neglect of older scientific innovators may be an important problem, because they are confident that they know that physicists and other scientists are most creative when they are young. Unfortunately, however the primary scientific source of this knowledge is the same scholars, using the same methodology, who assured us that "the only field that peaks before physics is poetry."[32] We know that this is

wrong for poetry: it isn't true that great poetry is invariably produced by the young. We don't know whether this is true for physics. But it may be extremely costly — for science, and for economic growth — to simply continue to assume that it is.

Lehrer quoted the powerful statement of Andrew Serazin, program office at the Gates Foundation, that "One of the tragedies of science is that many of the most talented people with the best ideas don't have access to capital."[33] Serazin may well be correct. But the tragedy is no less if those talented people with the best ideas include experimental late bloomers as well as conceptual young geniuses.

Footnotes

I thank Sebastien Gay, Joshua Kotin, Robert Lucas, Clayne Pope and James Poterba for discussions.

1. Elaine Barry, *Robert Frost on Writing* (New Brunswick: Rutgers University Press, 1973), pp. 58-59.

2. Robert Lowell, *Collected Prose* (New York: Farrar, Straus and Giroux, 1987), p. 10.

3. Edward Lathem and Lawrance Thompson, eds., *The Frost Reader* (New York: Henry Holt and Company, 1972), p. 419.

4. Mark Richardson, ed., *The Collected Prose of Robert Frost* (Cambridge: Harvard University Press, 2007), p. 132.

5. Jonah Lehrer, "Fleeting Youth, Fading Creativity," *Wall Street Journal* (Feb. 19, 2010).

6. David Galenson, "Literary Life Cycles," *Historical Methods*, Vol. 38, No. 2 (2005), pp. 47, 50.

7. Galenson, "Literary Life Cycles," p. 49. All of these poets had begun writing poems earlier, but their early work is generally considered of little interest, so for example the search of 47 anthologies cited here found no entries for poems that Frost, Stevens, or Williams wrote before the age of 30.

8. Edward Lathem, ed., *Interviews with Robert Frost* (New York: Holt, Rinehart and Winston, 1966), p. 4; Randall Jarrell, *No Other Book* (New York: Harper Collins, 1999), pp. 233-34.

9. Sylvia Plath, *Ariel* (New York: Harper Collins, 1975), p. xiii.

10. Sylvia Plath, *Letters Home* (New York: Harper and Row, 1975), p. 468.

11. Galenson. "Literary Life Cycles," p. 49.

12. Josephine Jacobsen, *The Instant of Knowing* (Ann Arbor: University of Michigan Press, 2002), p. 75.

13. Harry Lehman, *Age and Achievement* (Princeton: Princeton University Press, 1953), pp. 106-07.

14. The references for the statements of Gardner, Csikszentmihaly, Kaufman, and similar statements by other psychologists are given in David Galenson, *Old Masters and Young*

Geniuses (Princeton: Princeton University Press, 2006), pp. 171-72.

15. David Galenson, *Conceptual Revolutions in Twentieth-Century Art* (Cambridge: Cambridge University Press and NBER, 2009), pp. 32, 64-65; David Galenson, "Measuring Masters and Masterpieces," *Histoire & Mesure*, Vol. 7 (2002), pp. 53, 63.

16. David Galenson, "Portrait of the Artist as a Young or Old Innovator," *Historical Methods*, Vol. 39, No. 2 (2006), p. 66; Ernest Hemingway, *Green Hills of Africa* (New York: Charles Scribner's Sons, 1963), p. 22.

17. David Galenson and Joshua Kotin, "Filming Images or Filming Reality," *Historical Methods*, Vol. 40, No. 3 (2007), p. 129.

18. David Galenson, "The Reappearing Masterpiece," *Historical Methods*, Vol. 38, No. 4 (2005), p. 180; Galenson, *Old Masters and Young Geniuses*, p. 112.

19. Galenson, "The Reappearing Masterpiece," p. 180; David Galenson, "The Greatest Architects of the Twentieth Century," NBER Working Paper 14182 (2008), Table 2.

20. Galenson, *Conceptual Revolutions in Twentieth-Century Art*, p. 352; David Galenson, "The Greatest Photographers of the Twentieth Century," NBER Working Paper 15278 (2009), Table 2.

21. David Galenson, "From 'White Christmas' to *Sgt. Pepper*," *Historical Methods*, Vol. 42, No. 1 (2009), pp. 17, 21.

22. Lehrer, "Fleeting Youth, Fading Creativity."

23. Lathem, *Interviews with Robert Frost*, pp. 133, 268.

24. Virginia Button, *The Turner Prize* (London: Tate Publishing, 2003), p. 27.

25 Kenneth Clark, *Landscape Into Art* (New York: Harper and Row, 1976), pp. 181-97; John Gage, *Turner: Rain, Steam and Speed* (London: Allen Lane, 1972).

26. Clayne Pope and David Galenson, "Late Bloomers and Young Geniuses in Art and Science: From Cézanne and Darwin to Picasso and Einstein," in preparation.

27. Lehrer, "Fleeting Youth, Fading Creativity."

28. Timothy Taylor, "Bright Old Things," *Toronto Globe and Mail* (Feb. 26, 2010).

29. Lehrer, "Fleeting Youth, Fading Creativity."

30. Lehrer, "Fleeting Youth, Fading Creativity."

31. Lehrer, “Fleeting Youth, Fading Creativity.”

32. Lehrer, “Fleeting Youth, Fading Creativity.”

33. Lehrer, “Fleeting Youth, Fading Creativity.”