Toward a Behavioral Definition
of Genius

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The idols imposed by words on the understanding are of two kinds. They are either names of things which do not exist (for as there are things left unnamed through lack of observation, so likewise are there names which result from fantastic suppositions and to which nothing in reality corresponds), or they are names of things which exist, but yet confused and ill-defined, and hastily and irregularly derived from realities.

Francis Bacon, Novum Organum, 1939

This article discusses some of the troublesome issues involved in the concept of genius. An operational definition of genius is proposed; some of the implications for research on high achievement are presented; and supporting evidence is offered to indicate that it is possible to operationalize such an apparently global concept if one restricts its use to the behavioral, rather than to the sometimes superficially dramatic, components of high achievement. Because genius is typified by behavior that is exceptional, often unpredictable, and influential to many, it is not surprising to find genius a topic of concern for many eminent psychologists and social philosophers, for example, Freud, Galton, William James, Kretschmer, and Terman (Annin, Boring, & Watson, 1968).

For the most part, Western views of extraordinary creative behavior have been variations of two early Greek views of genius (Klineberg, 1931; Nahm, 1957) in which genius was equated with demigods, with madness, or with both. As an act of demigods, genius came from inspiration; the source of this inspiration was the gods and to be inspired was to personify a mystical power. Socrates described this power as a “daemon,” heard it “murmuring in his ears like the sound of the flute in the ears of the mystic.” Centuries later, Goethe expressed much the same point when he spoke of poets as “plain children of God” and stated that his poems “made me, not I them.” At other points in Western history, the Greek daemon has been spoken of as “divine spark,” “divine fire.” In the late Renaissance, Michelangelo was called “divino,” and it is not uncommon for artists of all types and from all eras to be described as “divine” in many circles. Such a view of creativeness as inspiration places the creative person within an implicit mythology, attributing his creative (inspired) moments to the intervention or the guidance of gods. Viewed this way, the major source of an individual’s creative behavior lies less within him and more outside him in the realm of the supernatural or preternatural.

The second early Western view ascribes madness to extraordinary creativity, which resembles what we now speak of as severe psychopathology. For Aristotle “there is no great genius without madness.” Coupled with “madness” was “possession,” for example, Plato’s view of poetic inspiration as a madness “taking hold of a delicate and virgin soul, and there inspiring frenzy, awakens lyrical and all other numbers.” In both of these accounts, we see a relationship presumed among human creation, personal or poetic madness, and demonic inspiration or possession. This view is not limited to the early Greeks; Dryden’s seventeenth-century axiom has come down to us as a basic belief of many: “great wits are sure to mad-

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2 This led a few of Freud’s contemporaries to attack the early psychoanalytic positions if not always for the best of reasons or with a light touch:

Nerve doctors who ruin genius for us by calling it pathological should have their skulls bashed in by the genius’ collected work. . . . One should grind one’s heel into the faces of all rationalistic helpers of “normal humanity” who give reassurance to people unable to appreciate works of wit and fantasy [Karl Kraus, quoted in Janik & Toulmin, 1972, p. 77].
ness near allied, and thin partitions do their bounds divide.” To the extent that one subscribes to such views, there are several serious implications. Extraordinary creative behavior is severely removed from scientific exploration as well as from the capacities of most persons; it is not under the control of “sane” or purposeful men.

Through the centuries, genius has been modeled after everything from demigods, heroes, prophets, martyrs, social activists, and supermen—“capable of re-creating the human cosmos, or part of it, in a way that was significant and not comparable to any previous recreation [Eissler, 1963, p. 1353],” 8—to the more mundane models such as children with very high IQ scores or persons with some inordinate “luck.” Encompassing such a variety of specimens over so long a history, the idea of genius is basically an intriguing idea with a sad and overgenerous past. Most of the work on genius, or exceptional creative behavior, has been a confusion of two classes of variables: factors of motivation (the “why” questions) and statements of consequences (the “effects” questions). The common behavioral denominators to this confusion have been rarity and social, as well as intellectual, consequences that are far out of proportion to, and of greater unpredictability than, most human endeavors. Because of such characteristics, theories of genius, like theories of history, have been used frequently as a means of selective bidding for a particular model of human nature (cf. Plumb, 1969). 4 Seen from these vantage points, creative people are heroic, mysterious, and inexplicable. But they are also not the stuff of science or, often, of this world.

**Galton and Freud**

The study of eminence and creative behavior needed the work of both Galton and Freud to get past many of the earlier, prohibitive attitudes and presumptions that bound thinking about creative behavior in such motley bundles of whole cloth.

Galton and Freud shared much of the nineteenth century’s interest in biological and developmental processes; they agreed in more than principle that genius and creative behavior are primarily biological phenomena. Out of this shared perspective emerges what has become a contemporary focus on genius and creative behavior—emphasis on an individual’s family as biological inheritance and as social-psychological influence. For Galton, the family was a genetic pool of talents that its progeny inherit, in different degrees, depending primarily on their biological distance from the center of the pool. For Freud, the family is a psychological reality in which conflicting, motivating processes are instigated and defensive patterns are shaped and interlocked. Out of the interrelationships between inherited talents and conflicts incited and shaped by the family, a person’s capacity for creative behavior emerges. Just as important, by viewing both development and capacity as matters of degree, Galton and Freud made a monumental break from earlier views of genius that ascribed to each person distinct states of inspiration, of possession, of enthrallment, or of complete lack of genius.

Needless to say, how one defines genius is critical to how one will study it. It is the basic step. Galton’s very effort to operationalize genius was itself extraordinary. Prior definitions had been remarkably varied, unanchored to observables, and almost always post hoc. Despite years of study, there had been a paucity of efforts toward agreement on what, why, or who genius was. Galton’s definition was and remains one of the few detailed ones. It rests on five interlocking propositions: that a measure of an individual’s genius can be derived from his degree of eminence; that on this rests a man’s reputation; that this reputation, although based on contemporary critical opinion, is long term in character; that critical opinion is focused on a real, extensively acknowledged achievement; and that such achievement is the product of natural abilities that are made up of a blend of intellect and disposition (or what is now termed intelligence and personality). The following excerpt from Galton makes this clear:

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9 Interestingly, much of the writing on geniuses, while not well defined, is very helpful in contributing to the development of psychohistory.

4 A good example of this sort of thing is the following statement by a leading late-seventeenth-century writer, Fontenell: There is a certain quality of mind or genius which you meet with nowhere but in Europe, or at any rate not far from it. It may be that it cannot, from its very nature, expand at once over an expanded area, and that some degree of fate compels it to keep within a more or less restricted sphere. Be that as it may, let us make the most of it while it is ours. The great thing is, it is not confined to matters of science and amid philosophical speculation; it embraces art and taste and beauty, in which spheres I doubt if there is any race in the world to equal us [quoted in Hazard, 1953, pp. 439-440, italics added].
Let it be clearly borne in mind, what I mean by reputation and ability. By reputation, I mean the opinion of contemporaries, revised by posterity. The favourable result of a critical analysis of each man's character, by many biographers. I do not mean high social or official position, nor such as is implied by being the mere lion of a London season; but I speak of the reputation of a leader of opinion, of an originator, of a man to whom the world deliberately acknowledges itself largely indebted [Galton, 1869, p. 33].

It is interesting to note in this statement that genius qua eminence was historically bound and a matter of revision, not a once-for-all-time phenomenon. There are several crucial implications to this definition. It deals in observable influences, not supposed ones or the momentary opinion of one or a few persons. In Galton's view, eminence is an objective attribute: it is known only after something occurs and influences a large number of persons over many years (at least long enough to be "revised by posterity"). An interesting correlate is that a person's genius may vary over the years, although the substrates of natural abilities on which it is based need not vary. As for the nature of the relationship between a person's eminence and those abilities, Galton again was remarkably and refreshingly specific.

By natural ability, I mean those qualities of intellect and disposition, which urge and qualify a man to perform acts that lead to reputation. I do not mean capacity without zeal, nor zeal without capacity, nor even a combination of both of them, without an adequate power of doing a great deal of very laborious work. But I mean a nature which, when left to itself, will, urged by an inherent stimulus, climb the path that leads to eminence and has strength to reach the summit—on which, if hindered or thwarted, will fret and strive until the hindrance is overcome, and it is again free to follow its labouring instinct [Galton, 1869, p. 33, italics added].

Seemingly paradoxical for a view that puts so much emphasis on other persons' opinions and external acknowledgement, Galton subscribed heavily to the idea that the necessary condition to genius is intrinsic motivation, "an inherent stimulus" that urges and compels hard work. That one needs abilities to match the compulsion goes almost without saying but should be recognized. Given a combination of strong urges and exceptional natural abilities, Galton thought that the continued interaction would establish a noteworthy reputation, that genius "would out." Nonetheless, a person's rank or eminence was always being judged, and he or she was placed by and among contemporaries. Galton, borrowing a very Darwinian proposition from his cousin Charles, looked upon social and professional life as a continuous examination. All are candidates for the good opinions of others, and for success in their several professions. . . . The world . . . [clearly a rather competitive one filled with candidates and judges] almost unconsciously, allots marks to men. It gives them for originality of conception, for enterprise, for activity and energy (pp. 5–6).

Of the personal attributes given marks, enterprise, activity, and energy suggest that effort is crucial to reputation and decidedly outweighs originality in Galton's opinion.

Galton's determination of the ranking of men is less satisfactory than his general model. His method was based on certain questionable assumptions, the major one being the source of accurate indexes of a person's reputation. For his rankings, Galton relied heavily (too heavily, some believe) on popular directories, such as Men of the Times, and on Foss' Lives of the Judges and The London Times obituaries. Although he placed an age requirement of 50 years or older as a gauge of a person's staying power in the world's good opinion, Galton did not appear concerned with the fact that the range of different types of noteworthy activities listed in such references was quite restricted and that such activities were very restricted socially in terms of likely candidates (cf. Annan, 1955, for a detailed discussion of how British families make up a prescribable network of talents, genetically and socially). Moreover, the basis for inclusion in such reference works appears to have been overly public, popular, and not always the most worthwhile, in spite of Galton's definition. Nonetheless, Galton's technique of ranking men and their relatives, his main object in the first place, has been highly influential, and was taken up and modified by Ellis (1904) and Cox (1926) among others. Every major study of eminence does, to some degree, bear a methodological resemblance to Galton's original tenets and technique.

Galton assumed that a man's genius or his potential for it, though evidenced by the man himself, derived from genetic sources entirely external to him. Even if genius was within the genetic pool of

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5 Nor did his methodology prevent Galton, like others, from declaring some groups having more "genius" than others and thus holding a superiority. There are two clear examples of this occurring in Galton's work. In Hereditary Genius (1869), what begins as a technical discussion of the statistical bases for his study ends in a litany of white superiorities. Later, in a letter to Alphonse de Candolle, Galton described Jews as "specialized for a parasitical existence upon other nations . . . [Pearson, 1911, p. 209]." It appears that Galton took more seriously than did Darwin himself the title of his great book, On The Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life.
his family, the locus of origin and the locus of control were outside the individual, since no one can choose his family of origin. Thus, Galton's position assigns importance to luck or chance as a determinant of genius. This bears a resemblance to the Greek view that a man of genius is one who, without choice, is touched by, inspired by, or visited by an outside god-spirit or daemon; one who is thereafter compelled or, in Galton's terms, "urged" to perform deeds that gain him a favorable reputation.

On the other hand, in Freud's view of creative behavior, while the locus of origin is external, the locus of control, like the major motives for creative behavior, is within the individual, allied to "madness" though it may be. Out of the meshing of the claims of biology and of society comes art. In Freudian theory, art, or creative behavior, is used in the service of protecting the individual and his primary groups, even if paradoxically it jeopardizes his reputation. Galton's creative individuals are not the potential enemies of society, that is, the "detonators of change" that Freud's are. Galton's world is more rewarding and accepting, "fairer," and less destructively critical than Freud's. Galton's social environment is Darwinian, judging the adaptive abilities and endurance of species through sheer capacity to survive. In Freud's world, survival is also at issue, but on a much different level.

Although he made a lifelong practice of studying men of genius—Leonardo Da Vinci (Freud, 1910/1953), Dostoevsky (Freud, 1928/1948), Moses (Freud, 1938/1955)—Freud never believed that he understood genius. In a later edition of Hereditary Genius Galton wished that he had used the word ability instead of genius in his title. Thus, Galton and Freud ended their studies of genius dissatisfied with it as an explanation.

Drawing a general conclusion at this point, one must confess that there is little that specifically helps in the understanding of genius or exceptional creative behavior. Pooling the work of Galton and Freud, we see genius as the esteemed product of high general abilities and continuous, energetic, highly personal effort over most of a lifetime. Implied in this conclusion are several aspects of interest. One does not have genius, one does genius-level work. High general abilities and prolonged, personal motivations are dispositional conditions to this level of performance. When we say a person has genius it is much like saying they have the flu—at best a descriptive label, superficial and begging questions. Genius is inferred from behavior having protracted influence; equally important, it is behavior that is eventually recognized as influential and esteemed by many of the influenced. We know that such behavior is itself considerably influenced by situational and environmental conditions, conditions which if left unacknowledged and unanalyzed give the appearance of luck or of genius to extraordinary achievement. Yet if one wishes to go beyond this general statement more is called for. Since historical eminence occurs in many different kinds of behavior, we need first to determine if there is a set of discriminating attributes common to this diversity of activities.

Definition of Genius

One should look to persons of recognized eminence for genius, since genius is evidenced in a consensus of peers and is operationalized through the various reward procedures that every society and profession has for acknowledging members' contributions (Cole & Cole, 1973; Zuckerman, 1967a). This statement follows Galton's wish to do away with the word genius. Furthermore, we should accept the fact that there is no one criterion, person, or group that can determine who has genius and who does not. Freud and others dealt with the motivational and personality correlates to creative behavior at levels and complexity deeper than Galton's "qualities of intellect and disposition." From them we take the idea that for the attainment of a great, enduring reputation, along with gifted cognitive abilities, there must be deep-seated, strongly persistent personality determinants operating, which are essentially developmental in nature, longitudinal in occurrence (rather than situationally determined and sporadic), and conducive to behavior of influence and consequence. These determinants urge men and women "to perform acts that lead to reputation" or eminence. Influence is a continuous phenomenon in every sense and is comparative and judgmental in part. Eminence is
built on influence and is social, as well as individual, in origin and behavioral in nature. For these reasons, eminence is built only on public acts.

Therefore, a person of genius is anyone who, regardless of other characteristics he may possess or have attributed to him, produces, over a long period of time, a large body of work that has a significant influence on many persons for many years; requiring these people, as well as the individual in question, to come to terms with a different set of attitudes, ideas, viewpoints, or techniques before all can have "peace of mind," that is, a sense of resolution and closure.

The work associated with this person must be presented to others, for their use and evaluation; it is a public work and takes other talented men and women years to understand, to implement, and, equally important, to surpass. It is others' necessary effort that makes up the basic thrust of this person's impact. Others often spend their own careers working out the implications of this work, for in the end they must come to terms with it. It is this aspect that is so important, whether it is wanted by others or predictable.

Acknowledgement usually occurs through the work being referred to often and being explicitly incorporated in others' work. The individual most responsible for the work receives institutionalized awards, for example, the Nobel prize, and, lastly, he becomes the object of archival interest, first within a profession (The Excitement and Fascination of Science, 1965) and, if his influence is extraordinary, eventually among a wider, interested lay public (evidenced in popular and "serious" biographies).

The key ingredient to genius is productivity—large in volume, extraordinary in longevity, more or less unpredictable in content. The impact of the work is dislocation or sudden reorganization constituting a major shift, that is, productions of "originality" rather than of reasonable extension (cf. Ghiselin, 1963; Kuhn, 1962, for an important discussion of this process in the physical sciences). Productivity in any area is a continuous variable. Influential productivity is also continuous, but it is very rare within any field, a point originally made by Galton. Cole and Cole (1967) reported that of the quarter million scientists appearing in the 1961 The Science Citation Index, only 1.08% had received 58 or more citations, which is the physics Nobel laureates' average number of citations between 1955 and 1965. Another study (Garfield, 1970) showed that on the basis of number of citations, one can predict the most likely candidates for the Nobel prize in science, and, in fact, did locate both winners in physics! The basis of long-term influence, extraordinary productivity, can be observed for many persons of extraordinary influence in a variety of areas: Bach's 46 volumes of compositions; Binet's 277 publications (Dennis, 1954b); Darwin's 119 (Darwin, 1896), Einstein's 248 (Well, 1960); Freud's 330 (Tyson & Strachey, 1956); Galton's 227 (Dennis, 1954b); Maslow's 165 (MacKinnon, 1972); and William James, who complained most of his life of work inhibition, produced 307 publications (Dennis, 1954a). Zuckerman (1967b) noted that laureates in science publish earlier, more, and longer than do matched scientists drawn from American Men of Science. The former have a median of 3.9 papers per year to the latters' 1.4 papers. Zuckerman noted even more prolific eminent mathematicians—Poincaré's 500 papers and 30 books over 34 years and the 995 papers of Arthur Cayley (who published a paper every two or three weeks).

Influential persons' productive longevity is also clearly observed: For example, Freud produced his psychoanalytic work over a 45-year span after shifting from neuropsychiatry in his late 30s; Picasso worked for over 75 years; Darwin and Einstein produced their work over periods of 51 years and 53 years, respectively. Raskin (1936) studied groups of eminent nineteenth-century scientists and writers and found that their periods of productivity averaged 34 years and 30 years, respectively (see also Lehman, 1953).

A number of studies have appeared over the years showing a close connection between extremely high productivity and the attainment of eminence in a variety of fields (Clark, 1957; Cole & Cole, 1967; Dennis, 1954a, 1954b; Lehman, 1953; Merton, 1961; Myers, 1970; Raskin, 1936; Zuckerman, 1967). Correlations between the number of citations (an empirical measure of influence) and peer ratings of eminence are .68 for psychologists (Clark, 1957) and .72 for physicists (Cole & Cole, 1967). In a report of psychologists (Myers, 1970), the correlation between the quality of a man's research and the number of citations to it is .89, extending Cole and Cole's (1967) observation on physical scientists that the number of citations is an exceptionally strong index of "the scientific significance" of a person's published work.

Taking influential, long-term productivity as the basis and hallmark of eminence, we can now put into sharper perspective several of the attributes...
that are often attached to genius. So-called "works of genius" may be the individual parts in a prolonged series of efforts made public over time. When examined closely, one finds that this voluminous series comprises a set of intricately linked core problems and an exceptionally large number of ideas about them (Merton, 1961), which, over time, lead to innovation. The term *innovation* is used here in the sense of "changes in something established" (*Shorter Oxford English Dictionary*, 1955) rather than the commonly held idea of "discovering" something never before seen or conceived—an apparent impossibility among humans.

The individual work is the measurable unit in assaying influence; but it is the series that conveys the influence by being an interrelated body of work. It is its interrelatedness that makes for both its impact and its being identifiable as the work of one or few persons. Eponymy, therefore, is more than an act of respectful recognition; it is an act of historical bookkeeping. To call a major segment of a science or art Darwinian biology, Einsteinian physics, Freudian psychology, or Newtonian, Pavlovian, Picasso-like, Chagal-like, etc., is to state for the record that a discernible historical development has occurred, that major periods of change are traceable and identifiable rather than random, fated, and more or less unattributable. Sooner or later, for some of the reasons given above (see also Footnote 7) the status of competing systems of thought or operations changes from major to minor, as was the case with hypnosis before and after psychoanalysis, or, more contemporarily, to the status of equality, as is the case with Pavlovian and Skinnerian models of learning phenomena.

So far we have spent a good deal of time discussing influence as one of the critical independent variables in the achievement of eminence. Yet, it would be misleading to suggest that the attainment of great influence, or impact, is what extraordinary creative behavior is all about, the aim of it all. It is not; it is the need to work on problems considered significant and troublesome by the individual. Influence is a highly personal, varied, and unpredictable adjunct to a man's work; man's specific aim for influence is erratic and its attainment out of his control. Influence and recognition may be sought, as they were with Freud (1925); or they may be explicitly repudiated, as they were by Wittgenstein whose voluminous work, both publications and lectures, had an impact equal to few other men's in generating two major schools of philosophy, logical positivism and linguistic philosophy (Malcolm, 1966). Influence may be of some importance, even if played down, as it was for Darwin (Darwin, 1896; Eiseley, 1965), or of minor importance, as it was for Einstein (Frank, 1947; Michelmore, 1962; Schilpp, 1949). Influence might be unintended, being the "spin-off" of a more immediate set of interests and activities, as in the case of Sir Walter Scott, who thought of himself primarily as a novelist but who, in the process of research for his historical novels, radically changed the aim and some of the techniques in the study of history (Trevor-Roper, 1971). Eminent persons might be as keenly aware of their influence as, for example, Nobel laureate James Watson, who recently enumerated the influences that have resulted from his and Crick's development of the DNA double helix: "the working out of the whole pathway of DNA synthesis, protein synthesis, the cracking of the genetic code, the total conception of how a virus can multiply [Crick & Watson, 1972, p. 820]." Watson stated with assurance that "none of this research would have been possible without starting off with the structure of the genetic material. If you pick up biological journals and ask what percentage of the biology being done today is a direct product of what we were doing, it is maybe 25 per cent [Crick & Watson, 1972, p. 820]."

**Consequences of the Definition**

The above definition, therefore, helps to clear up several misconceptions linked to the extraordinary influences which in the past have attracted somewhat romantic and even heroic explanations. "Undiscovered genius" is one common misconception. If our definition is valid, then one knows of persons of extraordinary abilities by the use of these abilities and by the subsequent influence they have. The proposed definition does not attempt in any way to second-guess history, for clearly there are no "might-have-beens," no undiscovered geniuses, no potential geniuses cruelly snuffed out or mysteriously prohibited (usually by an equally ill-defined fate). As we have seen, genius is, at best, a judgment placed on the degree of influence of a person's work and cannot be meaningfully placed on the origins or the style of that work, regardless of its appeal. Nor are there particular political, religious, social-economic groups, nationalities, races, or sexes with more genius than others, as others tried to demonstrate. Various groups of people may have more facilities, more oppor-
opportunities, and even more motivation, predisposing them to concern themselves with certain phenomena, but none has intrinsically more genius per se, for there is no such thing. Areas of interest and the preferred means by which they work are a function of the resources and traditions available (Lehman, 1947), not of any inherent qualities to members of the groups. As Clark (1969) reminded us, “although circumstances and opportunities may vary, human intelligence seems to remain fairly constant...” Who has more “genius,” the first men to harness fire or those who split the atom, those who developed the alphabet or those who used it to produce Oedipus Rex, Hamlet, or War and Peace? These are unanswerable questions that may call out preferences and prejudices but not meaningful answers. Nor can we put the tag of “genius” on work that is interesting to us or strikes us as unusual in some manner. This type of work obviously does not warrant the claim of genius unless such performances show the essentials of extraordinary creative behavior by being highly productive, influential, and generative over many years.

Some works are spoken of as being “ahead of their time”—a natural enough but not conclusive attribute to potentially significant work. This is not only post hoc but begs the question of what the merits are and for whom. Less dramatically stated, to call work “ahead of its time” means it was produced before it was well understood, as in the case of Mendel; before it could be technically confirmed, as in the case of Einstein; or before it could be appreciated and accommodated, as in the case of some major composers. If anything, these examples point to another facet of the generative capacity of influential work. Since it is simply not possible for a work to be done and, on that basis alone, to be judged accurately for its importance and/or the presence of genius, we turn to another index of extraordinary work of impact. It must be not only of large volume but it must be intellectually discontented and socially marginal persons, as in the case of Newton; they may be close, earnest friends and associates, as in the case of Darwin; they may be intellectually discontented and socially marginal persons, as in the case of Freud. It is in this way that schools of thought start—committed “students” learning the new material.

It is the final victory of a new idea to become the common, everyday property of the learned and of the deity, the mental furniture of businessmen, politicians, and professors...”

Lekachman asks, “what makes a book important?” and goes on to give a very specific set of criteria that are easily adjustable to fields other than economics:

In economics it is reasonable to term a book truly significant if after its appearance, economists think differently, students are presented with a fresh set of textbooks, politicians hear unexpected voices, and perhaps most important of all, the public at large comes to expect a different set of government policies and a transformed attitude. ... Keynes rewrote the content of economics and transformed its vocabulary [Lekachman, 1968, pp. 8, 58–59, italics added].

Adherents may come from a number of sources and for divergent reasons. They may be specifically recruited as in the case of Newton; they may be close, earnest friends and associates, as in the case of Darwin; they may be intellectually discontented and socially marginal persons, as in the case of Freud. It is in this way that schools of thought start—committed “students” learning the new material.
Such terms as unique and de novo are not only oversimplifications but grossly misleading. They make a very complicated and often contentious historical process appear ahistorical, split off from the rest of life, and, ironically, they belittle the very achievement they attempt to credit by conveying the false impression that the works in question occur in a relatively unchallenged field with few or no other persons working in the same area or even on the same problems. All that we know of important persons, work of influence, and eminence suggests just the opposite conditions hold true. That is why, in part, the works in question are significantly influential. If the issues involved are serious to begin with, so are the competitors and the resistances (cf. Ellenberger, 1970; Kuhn, 1962; Shakow & Rapaport, 1968, especially chapters 1 and 2 for very detailed discussions; Watson, 1968).

More Contemporary Issues and Evidence

Until now we have discussed the problems involved in defining genius. Within our concern for a proper definition has been a more basic, if implicit, concern: Can one predict who might become an eminent person? The importance of this question cannot be underestimated; related to its answer is our understanding of what the major facilitative variables and experiences are that contribute to the works that are underlying in the achievement of eminence. The essential issue is not eminence per se but the clues that indicate how we might increase the type of behavior that eminence results from.

Research on eminent persons has been conducted off and on over the many years since Freud's and Galton's pioneer efforts. The bulk of this research shows that persons who do achieve extraordinary eminence generally begin their productive careers significantly earlier than their less productive peers (Albert, 1971; Cox, 1926; Lehman, 1953; Raskin, 1936; Roe, 1952). More recent evidence on productive careers suggests that early starts are a solid index by which to estimate a person's productive ability. In several studies of University of Chicago PhDs, eight years after their receiving their degrees, Bloom (1963) showed that those more creative than matched controls had significantly more publications. In fact, the large majority of publications came from less than 10% of the subjects, which is consistent with Dennis' (1954a) earlier finding regarding eminent psychologists. Bloom concluded that "while productivity is clearly not synonymous with creativity, it seems quite likely that unless there is some minimum or threshold of productivity [8] there is little probability or likelihood that the individual is creative [p. 256, italics added]." Bloom's second study extends this point. It indicates once again that higher productivity characterizes the more creative person among chemists and mathematicians. Samples were matched for age, education, intelligence, and work experience. After a 10-year period, the more creative subjects averaged four publications yearly whereas their less creative controls averaged slightly less than .5 publications. Harmon (1963) confirmed these data in an investigation of 157 biological and 347 physical scientists who were divided according to their experience and specialties. From a pool of grade point averages, intelligence, achievement, and aptitude scores, as well as from work records and ratings of the scientists' professional attainment (judged by at least three independent raters working in the individual's fields), the best objective indicator of scientific accomplishment was found to be the number of publications for an individual.

We know that genius is not a function of differences in measured intelligence: Many researchers have found that once the IQ is higher than 120, other variables become increasingly important (Barron, 1969; Bloom, 1963; Cox, 1926; Harmon, 1963; Helson & Crutchfield, 1970; MacKinnon, 1962, 1968; Oden, 1968; Roe, 1952; Terman, 1954), although it would be absurd to argue that more "intelligence" would make no difference!

There are also interesting data pertaining to the "age of ascent" in productive careers. A number of studies have independently reported almost identical ages of "creative" subjects' first productions. Raskin (1936) noted 25.2 years and 24.2 years for her select groups of nineteenth-century subjects; Helson and Crutchfield (1970) noted 24.8 years for their subjects. Like Bloom's (1963) and Harmon's (1963) creative subjects, Helson and Crutchfield's creative subjects published more, as well as earlier, than their controls. Even more telling was the fact that Raskin was able to determine that as far back as 1735 the average age

[8] This observation appears congruent with the concept of a threshold of intelligence regarding the occurrence of creative behavior (cf. Butcher, 1968; Dellas & Galer, 1970, for a discussion of the literature on this issue).
for first publication was 25 years. When she separated her samples into the 25 highest ranking scientists and the 25 highest ranking men of letters (lists included Darwin, Faraday, Gauss, Maxwell, and Pasteur; Balzac, Coleridge, Goethe, Poe, Tolstoy, and Wordsworth), the average age for first productions was reduced only to 22 years. The present study shows that Freud was 21 years old at the time of his first professional publication, and Darwin and Einstein each were 22 years old at the time of their first papers, ages almost identical to Raskin's most eminent samples. Across a variety of fields and a two-century time span, there is a stable age at which eminent persons begin to be actively and publicly influential.

Additional data are closer at hand. Examination of the publication careers of 48 psychologists who, up to 1971, were awarded The Distinguished Scientific Contribution Award (DSC) by the American Psychological Association shows that, diverse as their special interests are, they are not too far from the performances described above for other fields. Recipients first published at the average of 25.3—almost identical to Raskin's (1936) and Helson and Crutchfield's (1970) subjects. Raskin also found that the productive careers of scientists and men of letters in her study averaged 34.2 years and 29.8 years, respectively. (We noted earlier that Darwin produced important work for over 51 years, Einstein for 53 years, and Freud for almost 55 years.) Recipients of the award have long productive careers before being honored—averaging almost 31 years of publishing up to the time of their recognition, although a few were in their forties and fifties when so awarded. Assuming that there might be a difference between the careers of those who received the DSC when it was instituted in 1956 and those more recently awarded, we analyzed data for the first and last 12 recipients. The median number of years between first publication and time of award was 25.5 and 26.5 years, respectively. With few exceptions, long productive careers precede psychology's highest acknowledgement of influential work.

This median number of years has been consistent, for over two centuries, for persons working in various sciences and different forms of literature. What factors are behind its stability? Although education, formal and otherwise, has changed tremendously over the past 200 years, the average age of first publications for young creative scientists and a variety of highly eminent people remains much the same. This fact leads one to speculate that the basis for the type of creative behavior leading to very high eminence requires a particular combination of cognitive and personality development and early family experiences, both of which begin early in childhood.

To test the rather obvious proposition that receiving the DSC is associated with professional influence, we compared the list of DSC winners with Myers' (1970) list of most-cited authors in psychology. The match is far from perfect. First, of the 48 DSC awardees 23 (48%) were among Myers' upper 2 percentile of cited authors, and 19 (31%) of the 62 most frequently cited authors received the DSC award. One needs to note that Myers' citation data were drawn from 1962–1967 APA journals. No psychiatric journals were used. The British Journal of Psychology and the Canadian Journal of Psychology were the foreign sources of citations. These facts place definite restrictions on the data. Nonetheless, other comparisons were made using Myers' lists of the most influential contemporary psychologists and the most influential psychologists of all time (see Myers, 1970, Table 5). These lists were based on the nominations of 220 graduate department chairmen. It is interesting to find that the lists are almost independent. Only Skinner appears on both. Second, although Freud's high citation (98 percentile) ranks him as 37 among Myers' 62 most frequently cited authors in nonpsychiatric, psychological literature, and although he is first among the all-time influential psychologists (he also appeared among Garfield's 50 most-cited authors in the 1967 Science Citation Index), he is not listed among the most influential contemporary psychologists. (His citation percentile rank is higher than three others on the list; the fact that he is dead is not a valid explanation, for so are three other men on the list.) Simply stated, frequent citation does not necessarily indicate an influential contemporary psychologist: Even the most influential psychologist of all time

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10 Other career characteristics of DSC recipients are as follows: median age of 54.6 years at the time of receiving the award; median age of 25.3 years at time of first publication in field of psychology; and continued average of 2.9 publications per year for a total average of 88.1 publications. In contrast to the dramatic deaths of Byron, Keats, Marlowe, Rimband, and Shelley before they were age 40, we should point out the long productive ages of many famous poets: Blake (70 years), Browning (77 years), Coleridge (62 years), Dante (56 years), Donne (58 years), Eliot (77 years), Frost (80 years), Shakespeare (52 years), Wordsworth (80 years), Tennyson (83 years), and Yeats (74 years).
is not necessarily influential in a contemporary sense (a finding that should protect us from "snap" judgments). Of the 10 most influential contemporary psychologists listed by Myers, however, all but one were DSC awardees. Among the 10 all-time influential psychologists, only 3 were DSC awardees but this may be a function of the small overlap in the time involved in the DSC and Myers' sampling. All in all, the relationships between a person's citation, eminence, and influence are strong but not perfect.

Another aspect of this relationship can be demonstrated. By taking Myers' lists of most-cited and most influential psychologists and comparing them to Roeckelein's (1972) list of most-cited psychologists in eight of the most widely used introductory psychology textbooks (which, by their nature, are intended to present the essentials of a field), one can see the educative influence that eminence carries with it. All of the most influential contemporary psychologists are listed by Roeckelein. In addition, Myers' 10 all-time most influential psychologists were referred to almost twice as frequently as his 10 most influential contemporaries (1,053 times versus 596 times). Counter to the data noted above, the person most frequently referred to was Freud. Holding the number one rank on Myers' list of all-time influential psychologists, he was referred to 409 times in the eight textbooks. The next highest referral rate (134) was to Piaget, who, while not yet among the all-time most influential psychologists, has had the longest productive career (62 years) among DSC awardees, is the second oldest DSC recipient (73 years old), and may have published the earliest scientific paper of any person—when 11 years old. (The extraordinary character of these data is clear when we see that the next youngest DSC recipients are three men who first published at age 21 and when we recall Raskin's and other data regarding age of first publication.)

The above evidence provides strong support for the basic contention in this article: Long-term creative behavior, as evidenced in influential productivity, is the "carrier" of genius qua eminence. The earlier a person starts and the more he does, the more likely will his impact on others be significant and, eventually, the higher his eminence will be. This does not say what, if any, special cognitive, cultural, personality, racial, religious, or social attributes are necessary or involved in such behavior. For the time being, we can say that injecting additional words like genius or unique into our thoughts on the matter does not appear at all necessary or helpful.

**Final Observations**

One aspect needs further consideration; in many respects it may be the most important; it is certainly the least understood. For creative behavior, or any behavior, to continue, there must be close congruence between some of the processes a person uses and some of the characteristics of the phenomenon dealt with. It would be difficult, if not impossible, at present to characterize such a "fit" as antecedent or consequence. What begins as a vague correspondence between process and phenomenon becomes progressively closer the more intensively and the longer a person does his work. Artists and scientists alike often speak of a dimly conceived, intuitively "reality" to their early efforts, one that appears early in life and seems to guide much of their behavior as a concerted effort to apprehend, to symbolize, and to control such a reality. Polanyi (1967) and Holton (1971) discussed such a consequence in Einstein's career.\(^{11}\)

\(^{11}\) Einstein's early years present a picture remarkable for its suggestiveness on this point. In a number of biographies and in Einstein's own autobiography, he appears at age 12 to have already worked free from what he termed: the chains of the "merely personal," from an existence which is dominated by wishes, hopes, and primitive feelings. Out yonder there was this huge world, which exists independently of us human beings and which stands before us like a great, eternal riddle, at least partially accessible to our inspection and thinking [Schilpp, 1949, p. 51].

We are told by Einstein that his early development of relativity came after ten years reflection . . . from a paradox upon which I had already hit at the age of sixteen . . . [furthermore] From the very beginning it appeared to me intuitively clear . . . [Polanyi, 1955, p. 59, italics added].

Another case of "intrinsic" development meshing with an extrinsic reality is Pascal's discovery of geometry. His sister Gilberte reported:

since my father has been so careful to conceal all these things [mathematics] from him that he [Blaise] was forced to invent his own names. Thus, he called a circle a "round," a line a "rod" and similarly for all the rest. Using these names, he set up axioms and finally complete proofs. And since, in these matters, one proceeds from one thing to another, he continued to make progress and pushed his investigations to the point where he reached the 32nd proposition of Book 1 of Euclid [Meschkowski, 1964, p. 34].

What makes this doubly interesting is that both Einstein and Pascal were roughly the same age when they made their independent, fundamental discoveries. This also fits into Merton's (1961) finding that many scientific "genius" are involved in repeated, independent, discoveries—what he termed "doubletons" and "triplets," for example, Newton and Leibniz, Darwin and Wallace.
A similar case can be made for Freud by going into his early family life and the cultural events surrounding him (Albert, 1973). Hollingsworth (1942) has shown that the interests and questions of the exceptionally gifted child are remarkably accelerated and border on the profound very early in childhood. With the “precocious” questioning and interest often comes an intense involvement with selected materials, problems, and cognitive processes that are consonant with later-discovered adult professions and life work. If one identifies his interests and special capacities early in life and discovers the existence of such possible enterprises, it follows that he is on his way earlier than most other persons (see Cox, 1926; Ellmann, 1959; Meschkowski, 1964; Roe, 1952; Schilpp, 1949).

The “realities” that make up the content of long-term creative behavior occur noticeably early and more or less independently. These parallels are not explicit and are far from exact; they require lifelong efforts to tease them out, not unique intelligence or aptitude.

Conclusion

The above arguments suggest that genius is not a blessing, a danger, or a fortuitous occurrence; it is not a trait, an event, or a thing. Rather, it is, and always has been, a judgment overlaid with shifting values. What genius has often been based on is far more solid—behavior. What it must be based on is creative behavior, which, although highly personalized, is made public and is eventually influential over many years and often in unpredictable ways. By being both productive and influential, this behavior can be measured, its influence traced, and the factors and events underlying it better understood. Of all the qualities attributed to persons of genius the most remarkable, along with perceptiveness, are continuity, endurance, productivity, and influence. Men and women with such attributes are usually esteemed and often honored. They are almost always eminent in comparison to others. But they do not have genius.

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