

Part VI. IMPLICATIONS FOR THE FIELD OF PSYCHOLOGY

After having reviewed all the empirical literature on great psychologists and their times, it becomes necessary to discuss the consequences of this body of work for the discipline of psychology.

Chapter 16. Research and Teaching

Discussion of these implications begins with an overview of the many important issues that still deserve more empirical investigation. Moreover, I discuss the problem of trying to provide comprehensive theoretical interpretations of all of these diverse results. The answers to these empirical and theoretical questions may also have consequences for the teaching of psychology at both undergraduate and graduate levels. Especially provocative is the possibility that this research can be used not only to make each psychologist a better scientist, but also to make psychology a better science.

It is my sincere belief that the scientific study of great psychologists both past and present can contribute to psychology's future greatness as an intellectual enterprise.

Specifically, I believe that this book has the potential to stimulate both
research and
teaching.

RESEARCH

In chapter 2 I discussed the metasciences, with special emphasis on the psychology of science. Quite naturally, a subset of this metascience includes the psychology of one particular science. And a special case of the psychology of psychological science is the psychology of those psychologists who have contributed most to making psychology a science. Yet despite the tremendous amount of research that has already been reviewed in the preceding pages, much more remains to be done. Future psychological research needs both to answer many empirical questions and to develop precise and comprehensive theoretical interpretations.

Empirical Questions

The range of topics treated in Parts II through V is certainly impressive. The psychology of the great psychologist already has something of the substantive scope of the typical introductory psychology text. Even so, while some topics were treated quite adequately, other topics could be given only superficial or exploratory treatment at best. Even worse, some important topics could not be examined at all, because the literature is still lacking. The only remedy for these deficiencies and gaps is a considerable amount of additional psychometric and historiometric research. Below I can merely suggest some of the questions that could keep researchers busy for years to come.

Output and impact. Judging from the wealth of secure empirical findings, the main topics of Part II appear to receive the most exhaustive treatment of any in this book. A great deal is known about cross-sectional variation in creative productivity and how this variation relates to a psychologist's eminence. Furthermore, our confidence in these results are reinforced by the fact that they essentially duplicate what has already been amply demonstrated in other forms of creative endeavor, in both the sciences and the arts. Perhaps the only place where a little more research might be nice concerns the equal-odds rule – the idea that the number of hits is a constant but probabilistic function of the number of attempts. Although this rule has been shown to apply to both individual differences and longitudinal changes in output and impact, the concrete and detailed workings of this principle need to be scrutinized. Why is it so difficult for a researcher to adopt a perfectionist strategy, only publishing top-notch work and keeping everything that will be merely ignored locked up in office file drawers? To what extent does the lesser work make the greater work possible? Are failures essential to success? If all psychologists were penalized for publishing unnoticed work, or if they were allowed no more than one publication per year, would the discipline gain or lose?

To illustrate one possible outcome, consider the results of the following investigation (Bayles & Orland, 1993). On the first day of class, a ceramics teacher informed his students that they would be arbitrarily divided into two groups. Those in one group would be graded solely on quality and those in the other on quantity. The final grade for each student in the quality group would be based on a single pot, which necessarily had to represent his or her best possible work. In contrast, the final grade for each student in the quantity group would be based on the sheer weight of the total number of pots he or she produced. Hence, those in the first group spend the whole class trying to produce the most perfect pot, whereas those in the second group churned out pot after pot after pot. At the end, however, the teacher had all pots rated for quality. And guess which group produced the best pots – the students in the quantity group! Of course, they produced a lot of bad pots, but the best works by these Mass Producers were more perfect than the best works that the Perfectionists could produce. Somehow, experience with failure is essential in acquiring the expertise that leads to success. Does the same principle apply to the careers of great psychologists?

This phenomenon might be probed using a number of techniques, such as a detailed content analysis of the journal articles published by notable figures in the field. In addition, it would probably prove useful to conduct a more fine-grained study of the longitudinal distribution of a psychologist's

output. For instance, one investigator has carried out high-resolution inquiries into the output of successful patents by hundreds of inventors (Huber, 1998a, 1998b). Unlike most studies reviewed in Part II, which usually aggregate output into 5- or 10-year periods of the career, these analyses took advantage of information indicating the exact date (day and year) that the patent was approved. This allowed the researcher to show that patents were randomly distributed across the career course. The number of inventions appearing in any given period was described by a Poisson distribution, with parameters compatible with those seen in our treatment of multiples (in chapter 13). This result implies that inventors only manage to arrive at successful patents because they engage in many trials, each trial having a very low probability of success. Endorsing further this interpretation was the outcome of a test for runs. This showed no strong tendency for these technological hits to accumulate in one or another part of the career. Hence, the probability of success is not increasing as the inventor acquires more expertise – nor is it declining. It would be highly instructive to apply the same methodology to journal articles, taking advantage of the published information regarding the dates that the manuscript was submitted or accepted (see, e.g., Huber, 2000). Moreover, these data can be combined with additional information about the disciplinary impact of each publication, according to citation indexes.

Finally, a complete understanding of output and impact probably requires that another fundamental issue be addressed: What determines the impact of a psychologist's publications? If the criteria of an article's quality were well defined and highly objective, it would seem easy to require that psychologists share only their best work with their colleagues. Yet as we learned in chapter 5, it is not easy to specify what constitutes an excellent contribution. Journal referees disagree among themselves, as do the reviewers of grant applications, and neither the referees nor the reviewers can successfully predict the short- or long-term influence of a particular research study or proposal. Notwithstanding the many suggested schemes for assessing the value of specific investigations, there is no empirical evidence that these schemes correspond to how publications are judged and used by other psychologists in the real world. So, what attributes of a paper *actually*, rather than just hypothetically, determine its scientific merit? Which of these attributes are shared with successful scientific publications in general, and which are unique to psychology?

Perhaps these questions cannot be answered fully without developing a suitable typology of contributions. For instance, Robert J. Sternberg (1998) has offered a "propulsion model" that identifies several distinctive types of creativity, which he called replication, redefinition, forward incrementation, advance forward incrementation, redirection, reconstruction/redirection, and reinitiation. It is conceivable that the criteria of scientific merit are contingent on the specific type of contribution being made. A paper that is merely trying to redefine the way psychologists look at things may be judged by different standards than a paper that tries to redirect completely the course of research in a given domain. In any case, until these issues are resolved, the psychology of psychological science contains a huge paradox. On the one hand, we know a whole lot about what it takes to become a great psychologist, including the primary role played by the psychologist's lifetime contributions. On the other hand, we know next to nothing about the factors that lead to a particular publication attaining the status of a contribution.

Individual Characteristics. Although there has been a considerable amount of empirical work on the cognitive and dispositional attributes of great scientists, including great psychologists, there remains much to be done on this subject. Perhaps the biggest gap concerns the lack of historiometric studies directly aimed at great psychologists. All studies since Cox's (1926) ambitious assessment of intelligence and personality have followed her example by investigating inclusive samples of creators and leaders. This is true, for example, in Edward Thorndike's (1950) historiometric examination of 92 eminent personalities. Yet it is possible to concentrate these methods on achievers in a single domain of creativity or leadership. For instance, a great deal has been learned about the intellect and character of United States presidents by the application of historiometric methods to biographical and content analytical data (Deluga, 1998; House, Spangler, & Woycke, 1991; Simonton, 1987d, 1988c; Winter, 1987). These methods have provided the basis for successfully predicting the performance of the

American chief executive in the White House. With only minor modification, this same methodology might be used to tease out the cognitive and dispositional attributes of those who have left the biggest marks on psychology's history. These assessments might also shed more light on why psychologists favor one or another scientific outlook. To what degree is a psychologist's position on the nature-nurture issue grounded in a deeper cognitive style or motivational makeup? Are those psychologists with a greater proclivity toward psychopathological symptoms more likely to appreciate the power of an irrational unconscious mind?

Computer simulations that more closely capture the discovery process in psychological science might also fruitfully augment empirical studies of personal characteristics. In chapter 6 I discussed the attempts by Herbert Simon and his associates to construct discovery programs (e.g., Langley et al., 1987). Unfortunately, this fascinating work suffers from two drawbacks from the standpoint of a scientifically informed history of psychology.

1. These programs endeavor to simulate discoveries in the physical sciences, most often in physics and chemistry. It would be valuable indeed to test models that attempt to make rediscoveries that have a notable place in the annals of the behavioral sciences. For instance, in chapter 6 I mentioned how it was possible to write a program that simulated Kreb's discovery of the urea cycle, and compare this simulation with Kreb's laboratory notebooks (Kulkarni & H. A. Simon, 1988). Perhaps the same can be done with respect to Darwin's discovery of the theory of evolution by natural selection, a discovery that is also well-documented in his extensive notebooks (Gruber, 1974; see also Tweney, 1989, for a cognitive analysis of Faraday's laboratory notes).

2. These discovery programs operate according to rather schematic and limited models of the creative process. They all are predicated on Herbert Simon's (1973) belief that scientific discovery has a precise logic, a step-by-step procedure by which well-defined heuristics are applied to a given domain of expertise. Yet as pointed out in chapter 6, it is very likely that this approach does not accurately represent the richness of actual human creativity. It is telling that the computer programs that have most successfully generated true discoveries – as distinguished from rediscoveries – incorporate some kind of stochastic mechanism (Boden, 1991). The most outstanding illustrations are the programs known as genetic algorithms and genetic programming (Koza, 1992, 1994). These programs operate according to a Darwinian process that is functionally equivalent to Donald Campbell's (1960) blind-variation and selective-retention model of creativity. Hence, in the long run, this approach may prove most promising.

So, maybe some day, discovery programs might succeed in simulating some of the great moments in psychology's history. Perhaps even further off, these programs might be given cognitive styles and personality dispositions that will demonstrate how various individual-difference factors specifically shape the origination of psychological ideas.

Developmental Correlates. Although the chapters in Part IV were replete with significant findings, the results reported were often based on samples of great scientists. Hence, more research is needed that concentrates on the key contributors to psychological science. Among the topics deserving of such specialized inquiry are birthorder, childhood trauma, the 10-year rule, professional marginality, and career development – such as the typical ages for founding journals or organizations. These investigations would help us better appreciate how great psychologists stack up against great scientists with respect to their life-span development.

More critical still is the need for more research on the development of great psychologists from underrepresented groups. With the exception of Jews, very little is known about the origins of those who managed to emerge from minority cultures. To what extent are the developmental factors different than those that contribute to the success of psychologists coming from the majority culture? The answer to this question is extremely important to those countries, like the United States, that have large and growing majority populations from which future psychologists will become increasingly drawn. By the same token, considerably more needs to be discovered about what enables women to become great psychologists. In chapter 12, for instance, I provided tentative evidence on behalf of what I called the Helson Effect – the tendency for great female psychologists not to come from families where their

development could not be stifled by brothers. Is this conjecture empirically valid? Does the impact of this effect lessen in more egalitarian times and places? Moreover, once a woman manages to launch her career, what is the most likely repercussion of marriage and family? Is motherhood necessarily harmful to research output? These questions have become more urgent than ever given the enormous number of women who now enter the discipline.

Many of the foregoing developmental questions can be subsumed under one all-encompassing issue: What are the relative contributions of nature and nurture to the emergence of the discipline's luminaries? To what degree is a great psychologist born or made? How do genetic and environmental forces interact to produce an individual who will make a lasting contribution to the field? Admittedly, there is no reason to believe that these issues will be more easily resolved for great psychologists than they have for the general population. Even so, psychologists should at least do the best they can to fathom this Big Question.

Sociocultural Context. It is probably safe to say that more research needs to be carried out in this area than in any of the preceding substantive questions. The topics covered in Parts II through IV are natural ones for psychologists to investigate, whereas those treated in Part V may appear more appropriate for the sociologist, anthropologist, political scientist, or historian of science. Nonetheless, work in this area can be considered a special branch of social, cultural, political, economic, and environmental psychologies. At the very least, those historians of psychology who are sympathetic with quantitative and nomothetic research should take seriously the possibility of finding an empirical basis for the commonplace assertion that the discipline's history is deeply rooted in the societal, cultural, political, economic, and environmental context. The following remark is certainly representative of what frequently permeates historical narratives: "We may say, as a number of historians have said, that systematic philosophy has come into existence only a few times on the face of the earth. It is in the great river mouths and coastal harbors where trade flourishes that man could 'keep the jungle down' and engage in local or international trade in such a way as to develop wealth and – for a few people – leisure" (G. Murphy & Kovach, 1972, p. 7). What empirical evidence, if any, supports this conjecture?

Besides discovering the external milieu that is most conducive to the emergence of great thinkers, future researchers must study how the sociocultural environment influences the qualitative aspects of the ideas that those thinkers conjure up. After all, the concepts that psychologists favor and the topics they investigate may be a partial function of external conditions and circumstances. To illustrate, consider the following speculation about how the American *Ortgeist* early on shaped the nature of psychology in the United States:

Alexis de Tocqueville wrote in *Democracy in America* following his visit to America during 1831 and 1832: "The longer a nation is democratic, enlightened and free, the greater will be the number of these interested promoters of scientific genius, and the more will discoveries immediately applicable to productive industry confer gain, fame and even power." However, Tocqueville worried that "in a community thus organized ... the human mind may be led insensibly to the neglect of theory." Aristocracies, on the other hand, "facilitate the natural impulse of the highest regions of thought." Tocqueville foresaw well. American psychology since its founding has neglected theory, even being openly hostile to theory at times. While Europeans such as Jean Piaget construct grand, almost metaphysical theories, B. F. Skinner argues that theories of learning are unnecessary. (Leahey, 1992, pp. 256-257)

However provocative this conjecture may be, the implicit nomothetic principle on which it is based has yet to be subjected to empirical evaluation. Are aristocratic societies more favorably disposed toward abstract thought than are democratic societies?

Chapter 13 was over twice as large as chapter 14, and therefore it can be inferred that much more is known about the internal factors involved in psychology's history. True or no, there still remains a large number of questions that lack complete answers. In particular, I believe that the following four issues could benefit most from additional empirical inquiries:

1. To what extent can we objectively determine where psychology stands in a Comtian-style hierarchy of the sciences? The results reported in Table 13.1 may be fascinating, but they are also incomplete. More disciplines must be evaluated – including all those in Comte’s original hierarchy – and more criteria must enter the quantitative evaluations. Moreover, this hierarchy should be examined over time to gauge its transhistorical stability. Are there periods in which the rank ordering of the sciences changes?

2. Apropos of this last question, what evidence is there that psychology is or is not paradigmatic? If paradigmatic, has the discipline undergone Kuhnian-type scientific revolutions? These questions are relevant to the preceding one because sciences may change their status in the hierarchy depending on their placement in the Kuhnian process (e.g., when a science enters the crisis stage). Yet, so far, speculations about the applicability of Kuhnian theory immensely outnumber investigations that directly evaluate its application.

3. To what degree is psychology’s history governed by Hegelian-like pendulum swings? Can we identify the specific theoretical and methodological issues that are most susceptible to such oscillations? What dialectic forces drive these shifts? Naturally, these difficult questions may not be easily answered. Yet with a little ingenuity, including the application of computerized content analyses, psychologists may come to understand better the fashion changes so conspicuous in its history.

4. How does the multiples phenomenon operate within psychology? Do the stochastic models discussed in Chapter 13 apply just as well to instances specifically drawn from the annals of the discipline? When two or more psychologists come up with the same idea, what determines who gets the credit? Why, exactly, must James share credit with Lange but Darwin not share credit with Wallace? Donald Campbell once suggested that because the more eminent psychologists make a name for themselves on the basis of numerous achievements, often it is the lesser-known psychologist who becomes honored with eponymic status. This happens because “the names of one-time contributors are more efficient than the names of the great who contribute many principles to science” (D. T. Campbell & Tauscher 1966, p. 62). Supposedly, this is one reason why Emmert became known for “Emmert’s Law” rather than Schopenhauer, Séguin, Lubinoff, or Zehender. But is that really the operative nomothetic principle?

Besides all of these issues, the central topic of chapter 15 – the relation between genius and the *Zeitgeist* (or *Ortgeist*) – definitely demands more empirical scrutiny. What nomothetic principles are identical for both individual- and aggregate-levels of analysis? Which ones are dramatically different, even contradictory? What psychological processes intervene between the sociocultural system and individual behavior? To what degree do a great psychologist’s personal qualities moderate the effects of the external milieu? Studies of eminent leaders have revealed how individual and situational factors can interact in intricate ways to determine leader success (e.g., Simonton, 1987d; L. H. Stewart, 1977; Winter, 1987). Are great psychologists also the complex repercussion of being the right person at the right place and at the right time? If so, what are the essential components of this winning configuration of individual and situational determinants?

Theoretical Interpretations

In line with Tocqueville's generalization about American distrust of abstract theory, the foregoing discussion only mentioned what I, an American psychologist, considered to be the most promising questions for future empirical study. In short, I listed the areas where we need more facts. Yet, at risk of breaking faith with my *Ortgeist*, I would like to suggest the need for theoretical research as well. Ultimately, it may be possible to subsume the diverse empirical findings under a single, comprehensive yet precise theory, or perhaps a set of interconnected theories. The following three theoretical frameworks may have the most potential for accomplishing this integration of empirical findings, namely, the attributional, the economic, and the evolutionary.

Attributional theories. Just as "beauty is in the eye of the beholder," so may a psychologist's greatness reside in the minds of his or her colleagues. Hence, attributional theorists would look at a psychologist's greatness in terms of the general manner in which human beings make inferences about other people's dispositions. Because these inferential processes are contaminated by all sorts of cognitive biases (e.g., the "fundamental attribution error," the "availability heuristic," and "negativity bias"), these assessments may not correspond very closely with the psychologist's true merits, as represented by overt behaviors. This theoretical approach has already been applied successfully to the phenomenon of exceptional leadership, especially United States Presidents (Simonton, 1986b, 1987d). Moreover, judgments of a person's creativity have also been explained in attributional terms (Kasof, 1995; cf. Simonton, 1995b). When historians identify someone as a "creative genius," that may prove more informative about how historians engage in myth-making attributions than about how highly creative individuals actually behave. This position is compatible with E. G. Boring's (1963) views about the arbitrary assignment of eponymic status to the various figures of psychology's history.

Economic theories. Because creativity is a productive activity (i.e., generates "products" through "labor"), it may be explicated in terms of "investment," "human capital," "utility functions," and other concepts in classical economics (e.g., Diamond, 1984; Levin & Stephan, 1991; McDowell, 1982). According to this view, great psychologists invest a considerable amount of effort to acquiring expertise so that they can produce works that will obtain high-paying and prestigious positions. Some economic models do an excellent job predicting the career trajectory in creative output (Diamond, 1986). For instance, the decline in output toward the end of the career is said to occur because of changes in the cost-benefit ratio associated with productivity (e.g., works produced early in the career have a bigger impact on lifetime earnings than do works produced late in the career). Recently, theories have emerged that are "psychoeconomic" in nature (Rubenson, 1990; Rubenson & Runco, 1992). As the name implies, these theories integrate economic concepts with psychological processes. An example is Robert J. Sternberg's "investment theory of creativity" in which highly successful creators operate according to the principle of "buy low, sell high" (Sternberg & Lubart, 1991, 1995).

Evolutionary theories. In 1880 William James published an essay on "Great men, Great thoughts, and the Environment" in which he attempted to interpret greatness in terms of evolutionary theory. James specifically viewed human creativity as a variation-selection process. In 1960, Donald T. Campbell developed this notion further in his blind-variation and selective-retention model of creative thought. Because both James and Campbell concentrated on the creative process, I have endeavored to link this Darwinian theory of creativity with other aspects of the phenomenon, such as the personality, development, and sociocultural context of eminent creators. This endeavor began with my 1988 book *Scientific Genius: A Psychology of Science* and continued most recently with my 1999 book *Origins of Genius: Darwinian Perspectives on Creativity*. Over the same time period, several other investigators have joined this theoretical enterprise (e.g., Cziko, 1998; Kantorovich, 1993; Kantorovich & Ne'eman, 1989; Martindale, 1990, 1995). Probably the most notable of these contributors by far is Hans Eysenck, whose 1995 book *Genius: The Natural History of Creativity* combined the "Campbell-Simonton" model of creativity with his own personality construct of Psychoticism. Obviously, I believe that this

expanding evolutionary system has immense explanatory potential. This belief is reinforced by the following three considerations:

First, several scholars in the philosophy of science have proposed doctrines that are explicitly evolutionary (Hull, 1988; Shrader, 1980; Stein & Lipton, 1989; Toulmin, 1981). Karl Popper (1979), for one, explicitly stated that

the growth of our knowledge is the result of a process closely resembling what Darwin called “natural selection”; that is, *the natural selection of hypotheses*: our knowledge consists, at every moment, of those hypotheses which have shown their (comparative) fitness by surviving so far in their struggle for existence; a competitive struggle which eliminates those hypotheses which are unfit. (p. 261)

The emergence of these “evolutionary epistemologies” has also attracted the participation of psychologists (e.g., Plotkin, 1993). Perhaps the most notable among them was Donald T. Campbell (1974) himself.

Second, several historians of science have found evolutionary theory a fruitful approach to interpreting the history of scientific ideas in evolutionary terms (e.g., Bing, 1990; Parshall, 1988). In other words, Darwinian theories can provide a useful scheme for constructing historical narratives (Richards, 1981). In agreement with Popper’s (1979) assertion, a selection process operates to weed out those hypotheses that fail to fit the facts. In the case of psychology, however, the facts entail both objective data and subjective experience. It may even be the case that “a theory that, among other things, makes sense personally may survive longer than one that develops and is tested within the realm of science” (Hergenhahn, 1992, p. 481).

Third, increasingly more psychologists have become convinced that evolutionary theory may provide the most powerful basis for understanding human cognition and behavior (Barkow, Cosmides, & Tooby, 1992; Bradie, 1995; Crawford & Krebs, 1998). In a sense, psychology is returning to the basic tenet of the Functionalist School, namely, the concept of mental processes as adaptations. The advent of connectivism in cognitive psychology also strengthens the conviction that evolutionary theory holds great promise, given the intimate conceptual linkages between connectionist models and Darwinian theories of creativity (Martindale, 1995).

If the evolutionary philosophies and histories of science become unified with a Darwinian psychology of science, the end result may be comprehensive scientific theory of great psychologists. This theory may not only help us explain psychology’s past, but also help us understand psychology’s present and even predict psychology’s future.

TEACHING

The empirical and theoretical questions just raised are sufficiently rich to keep researchers busy throughout the 21st century. Besides the intrinsic interest and scientific value of these questions, their answers can make direct contributions to how psychologists educate the next generation of psychologists. These contributions take place at two levels, undergraduate instruction and graduate training.

Undergraduate Instruction

The upper-division course on the history of psychology – or history and systems of psychology – has long been a very common part of the undergraduate psychology curriculum (Riedel, 1974). According to an extensive survey of psychology programs at colleges and universities (both national and regional), such a history course was offered by 81%, and was required by 36% (Messer, Griggs, & Jackson, 1999). Often the class is conceived as a “capstone” course that culminates the psychology major’s encounter with the discipline (Raphelson, 1982). Of course, this course can be taught in more than one manner (A. J. Smith, 1982). For instance, some instructors may prefer the “great person” perspective, whereas others may favor the “history of ideas” perspective. Yet, on the basis of the research reviewed in this book, I would like to suggest another approach – the “psychology of science” perspective. This approach has implications for what kind of textbooks might be written and what kind of course assignments might be required.

Textbooks. When taught at the undergraduate level, history of psychology courses will almost invariably have a required textbook. As pointed out in chapter 2, some of these textbooks may take the “great person” perspective, and others may adopt a “history of ideas” perspective. Yet it is also possible to conceive a textbook constructed around the “psychology of science” perspective. Such a textbook would take full advantage of all the nomothetic results that I have reviewed throughout this volume – the empirical findings with respect to output and impact, individual characteristics, developmental correlates, and sociocultural context. These conclusions would provide generalizations that can provide the basis for understanding a particular notable idea or famous figure (Simonton, 1995a). In different terms, the generalizations can serve as “covering laws” for comprehending the course of psychology’s history (Hempel, 1965). Sometimes these covering laws might show that a particular figure simply exemplifies what we would expect on the basis of past research. For instance, in chapter 3 I mentioned how Wilhelm Wundt’s phenomenal output fell right in line with what the research shows is characteristic of a major creative genius (Bringmann & Balk, 1983). Other times these covering laws might indicate how a particular luminary departs from expectation, and thereby provides an “exception to the rule.” I gave just such an example at the close of chapter 4, when I discussed how John B. Watson’s career was dramatically and suddenly terminated by the sex scandal that obliged his resignation from the academic world. Yet this very exception suggests an historical “counterfactual,” namely, if Watson had behaved in a manner consistent with his religious upbringing, his output and influence would have been even more impressive. Watson was clearly on a fast-track career trajectory, one associated with prolific and influential productivity over the life span.

What does the student gain from such specific applications of these nomothetic principles? To begin with, the student learns not only that psychology has discovered how people in general behave, but also how psychologists behave, not excluding the great psychologists whose names fill the textbooks and lectures for all the courses they have taken in the major. Moreover, because the psychology of science encompasses the psychology of scientists, students would also acquire a superior understanding of the nature of scientific creativity, even when it reaches the level of a Galileo, Newton, Pasteur, or Einstein. At the same time, because the generalizations that provide these covering laws are statistical rather than deterministic, the student learns to appreciate that there always exist exceptions to any nomothetic statement in the behavioral sciences. This does not mean that the statement is completely overturned, but only that, as Alexandre Dumas *fils* humorously warned, “all generalizations are dangerous, even this one” (quoted in Esar, 1949/1989, p. 67). Specific illustrations of this precaution

might be provided, such as Figure 8.1, which shows how much the data can depart from a nomothetic relation even when that association accounts for a respectable amount of variance (viz., 11%).

Instances like these can provide ideal occasions to discuss the effect sizes typical of psychological research (Rosenthal, 1990; Rosenthal & Rubin, 1979) as well as the real-world consequences of putatively “small” effects (Abelson, 1985). To illustrate, a correlation of .40 between two dichotomous variables (with 50-50 splits) means that “only” 16% of the variance is shared. In more concrete terms, fully 30% of the cases will contradict the nomothetic association (i.e., fall in the wrong quadrant of the 2×2 table). Yet not only do 70% of the cases still comply with statistical expectation, but also the practical consequences can be quite substantial. If this were a drug treatment for a fatal disease, a correlation of .40 still implies that the chances of survival would be improved 133 times by taking the medication (Sulloway, 1996). This enhancement is far from negligible.

Furthermore, from scrutiny of such data the student can learn that departures from statistical prediction most likely indicate the effects of other factors, factors that form part of other nomothetic principles left out of the prediction (Simonton, 1990d). Thus, the reason why there exists scatter around the curvilinear function shown in Figure 8.1 is that there are many variables that systematically influence a psychologist’s long-term impact besides his or her theoretical and methodological orientation. Presumably, only when all of these omitted effects are included will departures from statistical expectation become negligible. In short, the psychology of science approach to the history of psychology can be used as a vehicle for describing the science of psychology. The history of psychology thereby becomes more closely integrated with other psychology courses, especially those in personality, developmental, and social psychology.

Admittedly, not all psychologists would welcome this merger of idiographic history with nomothetic science. In fact, many historians of psychology are downright hostile to psychological science (Simonton, 1995d). Consonant with Snow’s (1960) notion of the “two cultures” mentioned in chapter 8, historians commonly feel more sympathetic with the humanities than with the sciences. This sympathy fits with the history of science in general (for rare exceptions, see Donovan, L. Laudan, & R. Laudan, 1988). Nevertheless, this alignment does not mean that historians scrupulously spurn nomothetic principles when they write textbooks. On the contrary, most histories of psychology are riddled with such generalizations, however implicit their statement (Simonton, 1995a). To make this apparent, representative quotes from these histories have been sprinkled liberally throughout this book. Nor do these generalizations come exclusively from textbook authors who cannot be considered historical scholars. Nomothetic claims are abundant in histories written by psychologists who have attained some reputation for their historical scholarship. To name names, clear examples may be found in the writings of Wolfgang Bringmann, Rand Evans, Laurel Furumoto, Thomas Leahey, Robert MacLeod, Gardner Murphy, Daniel E. Robinson, Elizabeth Scarborough, Wayne Viney, Robert I. Watson, Michael Wertheimer, and even E. G. Boring (Simonton, 1995a, 1995d). Consider the following additional instances, both coming from the pens of psychologists who were elected President of APA’s Division on the History of Psychology (Division 26):

1. “Many more recent views such as those of Clark Hull or Kenneth Spence were quite similar to those of Hartley, in spite of Karl Lashley’s warning early in the present century that explanations of behavior in terms of reflex arcs and chains of associated neurons are doomed to failure because they are too static,” said Michael Wertheimer (1987, p. 42), adding “Perhaps the idea holds on so tenaciously because it is so beautifully simple.” Here the principle is that parsimony supersedes that factual confirmation in the popularity of scientific ideas.

2. Daniel Robinson (1986), in discussing the ancient Greek philosophers, advised that we are to recognize Socrates and his pupils as the enlightened and reflective critics of an age and to realize that such philosophers, in any period, will perceive themselves as unheard by, even inaudible to “those commoner natures.” ... Seeing an entire population deluded by the trappings rather than the essence of greatness, they rejected perception as a means by which knowledge might be apprehended. Watching a world tossed in seas of change, they searched for that which

never changed and called it truth. Noting the sad fate of a people moved by passion, they devoted themselves to impersonal reason. (p. 54)

Here great thinkers are said to advocate positions that constitute Hegelian reactions to the fads and foibles of their times.

Given that even the best historians like to incorporate such explanatory statements into their narratives, it behooves them to make sure that the cited nomothetic principles have an empirical foundation. Hence, by relying on the “psychology of science,” historians can make their historical interpretations more scientific. To illustrate how this application might be carried out in practice, consider an essay on Christine Ladd-Franklin written by another Division 26 President, Laurel Furumoto (1992). To understand the “gender-lined societal forces that operated to exclude [Ladd-Franklin] from a career in science” as well as the “numerous enabling influences in her life ... that served to counter them” (p. 175), Furumoto quoted extensively from the volume *Uneasy Careers and Intimate Lives: Women in Science 1789-1979* (Abir-Am & Outram, 1987). The quotations were designed to show that Ladd-Franklin fit the generic profile of the successful female scientist. According to Furumoto, these congruencies included the fact that Ladd-Franklin “had a father who displayed strong interest in his daughter’s education and achievements” (Abir-Am & Outram, 1987, p. 15), that she came from “a middle-class background that became unstable through a variety of political, economic, social, or natural events” (p. 16), that she benefited from these circumstances because “a family’s decreased capacity for social conformity often allowed more educational freedom for its daughters” (p. 16), and that when she entered adulthood she found that because “gender constrained [her] integration into mainstream – that is, disciplinary and empiricist – sciences” she had to “resort to transdisciplinary and theoretical strategies of claiming scientific authority” (p. 9). All in all, the fit between Ladd-Franklin’s idiographic particulars and the nomothetic patterns suggests that her development had to follow much the same pathways as other talented women struggling to make name in a male-dominated world.

In one respect, histories written along these lines would fulfill E. G. Boring’s (1963) call for a purely naturalistic approach. Yet for Boring, the term “naturalistic” was placed in opposition to “personalistic.” His ideal was to “extirpate” from the history of psychology “all the names of Great Men.” In contrast, the history texts I foresee would be both naturalistic and personalistic. Because the psychology of science necessarily includes the psychology of the scientist, which in turn must incorporate the psychology of great scientists, the big names of history can be discussed in the context of nomothetic research. Indeed, by providing the naturalistic context of great psychologists, the personal nature of their contributions can be better appreciated. The student can then comprehend when a figure merely exemplifies an established generalization and when that same figure constitutes an exception to another generalization.

Assignments. This last statement leads to the other recommendation about how to teach an undergraduate course in the history of psychology. Instructors in such courses will frequently require a term paper. This assignment may cover any of a number of topics, some more compatible with a “great person” perspective and others more consistent with a “history of ideas” perspective. For the past decade I have been assigning a term paper that operates from the “psychology of science” perspective (Simonton, 1994b). Like the “great person” approach, the student commences the assignment by selecting a single major figure in the discipline’s history. To facilitate their choice, I provide them with lists of great psychologists drawn from various sources (e.g., O’Connell & Russo, 1990; Zusne, 1987a). The students are encouraged to find someone whom they might consider a role model – an especially valuable option for women and minorities in the major.

The students also receive a questionnaire that lists all the facts that they should attempt to obtain from biographical and autobiographical sources. As seen from Table 16.1, these items include biographical background, education and training, personal characteristics, career development, and sociocultural context. They are told that the information they are to gather on these topics will enable them to write a “psychobiography” that addresses the issue “was ___ a scientific genius?” This issue actually entails several subsidiary questions: Did the chosen subject’s life and work look typical of a creative genius? If so, which kind of creative genius, artistic or scientific? If scientific, did he or she have the attributes of a revolutionary or normal scientist?

Table 16.1

Sample Items from Questionnaire for Term Paper on Major Figures in the History of Psychology

Family background: What was the socioeconomic class of your subject’s family? His/her father’s occupation? His/her mother’s occupation? His/her father’s educational level? His/her mother’s educational level? His/her father’s age at the subject’s birth? His/her mother’s age at the subject’s birth? His/her father’s interests and hobbies? His/her mother’s interests and hobbies? His/her father’s ethnicity? His/her mother’s ethnicity? What was his/her father’s religious affiliation? His/her mother’s religious affiliation? Was his/her father a first, second, or third-generation immigrant? Was his/her mother a first, second, or third-generation immigrant? What language was spoken in the home? Were this the same as the culture at large? Any bilingualism? Were there any other notable achievers in the family pedigree? Is there any evidence of pathology in the family lineage, such as mental illness, suicide, drug abuse, or alcoholism? What was the subject’s birth order? What was the size of the family in which he/she grew up? Were there older and younger brothers and/or sisters? Did your subject experience parental loss in childhood or adolescence? Who was (or were) the person(s) who died? How old was he/she when this happened? Any other traumatic experiences? Did he/she suffer from any physical, mental, or emotional handicaps? Was your person popular with peers or a loner? Any evidence of intellectual precocity?

Education and training: What were his/her reading habits in childhood and adolescence? What were your subject’s favorite hobbies? How well did he/she do in school? How well did he/she do in college? What was the quality or prestige of the institutions in which your subject was educated? What level of formal education was attained (give highest degree)? What was the age at receiving his/her highest degree? Any honors or awards in school? Any honors or awards in college? What extracurricular activities did he/she engage in? Any important role models in youth or early adulthood? Any important mentors or teachers? Whom did he/she most admire? Any “crystallizing experiences” that decided your subject on their life course? Was your subject’s training marginal or central to the domain in which eminence was ultimately obtained? If an outsider by training, did that marginal background leave an impression on your subject’s distinctive contribution?

Table 16.1 (continued)

Personal characteristics: Was he or she highly intelligent, perhaps even possessing a genius-level intellect? Independent or nonconformist? Introverted? Risk taking? Hardworking, even workaholic? Did he or she have broad intellectual interests? Was he or she extremely versatile, contributing to more than one field? Any evidence of psychopathology, such as manic-depression, neurosis, or mild psychosis? Was your subject an intuitive thinker? Any examples of leaps of imagination or inspiration? Was there a sense of purpose, of destiny underlying his or her work? Was everything your subject did, no matter how diverse, connected by some central theme or preoccupation? Any examples of serendipity? What was your subject's sexual orientation? Monogamous? Married? Any children? If so, how many? Divorced? Widowed? Remarried? How did your subject die? How old?

Career development: What kind of professional positions were occupied? Did he or she attain a professorship at a distinguished university? Did your subject establish relationships with a considerable number of notable contemporaries? Did your subject have many students and disciples who attained success? Did your subject have any important collaborators? Did your subject have any important rivals? At what age did he or she first make a contribution to his or her field? At what age did your subject produce their single best work, or "masterpiece"? At what age was the last contribution made? Any instances of some "swan song"—some final work conceived shortly before death that encapsulated in a distinctive manner the entire course of a career? What was the total number of works produced? Did the rate of productivity rise to some peak and then decline in a fashion you would anticipate, or were there some surprises? As your subject got older, did he or she become the defender of the status quo, rejecting innovative ideas?

Sociocultural context: Did your subject work in times of economic prosperity? Did your subject work in times of peace or war? Did your subject work in times of political freedom? Did your subject work in times of cultural diversity? Did your subject work in times when his/her field was experiencing a "Golden Age"? Did your subject fit in with the mood of the times or was your subject ahead of the zeitgeist? Were the ideas rejected by contemporaries so that he or she experienced an uphill fight to fame or did acceptance come easily? Can you identify any examples of "multiples," that is, did anyone else come up with the same ideas as your subject at roughly the same time? Did a priority dispute result?

Influence on field: How influential were the works produced in your subject's own time and ours? Did your subject have failures as well as successes? To what extent was your subject's impact due to taking extremist positions on certain theoretical or methodological issues? Did your subject receive any contemporary recognition, such as special honors or awards? Any posthumous honors or memorials? What was the ultimate impact of your subject to making psychology a genuine science? Did your subject make any contribution that remains important today?

Note. Questions taken from information in Appendix of "Scientific Eminence, the History of Psychology, and Term Paper Topics: A Metascience Approach," by D. K. Simonton, 1994, *Teaching of Psychology*, 21, 170-171. Copyright by Lawrence Erlbaum Associates.

To help them determine how to draw the necessary inferences from their data, I do three things.

- First, in every single lecture I provide hints scattered here and there about the nomothetic implications of an idiographic particular. If I mention a notable's birthorder, then I note whether or not this is characteristic of revolutionary scientists. If I give the age at which a figure received his or her doctoral degree, I compare this fact with the typical age that psychologists earn their PhD.
- Second, three lectures in the latter part of the quarter are devoted to the metasciences, and two of these are specifically assigned to discussing the psychology of scientific genius. At that point I ask the students to bring their completed questionnaires to class so that we can proceed down the list of facts. I then indicate what implications may be drawn, underlining all the while that the various implications may not necessarily point in the same direction. That is, one datum might imply that the subject is a scientific creator, whereas another might hint that he or she is an artistic creator. The students must learn to balance and evaluate complex and contradictory information in order to arrive at a coherent assessment.
- Third, I assign a supplementary text that will provide the needed information about the behavioral, cognitive, motivational, developmental, and social aspects of scientific genius. I first used my 1988 *Scientific Genius*, but more recently turned to my 1999 *Origins of Genius*. Besides being more update on the empirical research, the latter text provides a Darwinian framework that students use to coordinate the factual information. Moreover, because this book uses Darwin as an extended illustration of the nature of scientific genius, it provides an example of how the nomothetic principles can be applied to the specific case. As a result, Charles Darwin is the only subject that the students cannot select for their term paper.

The final papers are graded on how well they formulate and defend a thesis based on the general theory and the specific facts. To make this determination, the students are required to attach their completed questionnaire to their term paper when they turn it in. It is also made very clear that they can take any stand they want as long as it is adequately argued and documented. Thus, one student might hold that Freud was a genius but not a scientist while another might maintain that he was a scientist but not a genius – and still both might earn top grades. I have even assigned A's to papers that took positions that I personally found unacceptable (e.g., that Francis Galton was not a scientific genius), so long as the fact and logic formed a coherent thesis.

This assignment has several assets.

- First, the students must learn a tremendous amount of information about a single major figure in psychology's history. At the same time, all of these numerous facts must be logically integrated with an abstract theoretical scheme. That means that the student cannot just "regurgitate" undigested facts, but rather the paper requires critical thinking.
- Moreover, the assignment teaches students the elusive connection between a single person's behavior and empirical generalizations based on statistical analyses. Even robust statistical results with impressive effect sizes can allow the existence of numerous outliers. Thus, students learn firsthand the distinction between what happens on the average and what happens in the singular case. "You can never foretell what any man will do," said Sherlock Holmes, "but you can say with precision what an average number will be up to. Individuals may vary, but percentages remain constant" (quoted in Doyle, 1986/1890, p. 175).
- The assignment also has a favorable impact on how students react to the lectures. Every lecture contains clues about what kinds of things to look for in their chosen subject and what those things might mean. Indeed, by tying biographical details to theoretical implications, facts acquire meaningfulness that might otherwise be considered mere historical trivia.
- Finally, the students both enjoy and value the term paper. In fact, the popularity of the course increased after I adopted this particular assignment, and it has now become one of the most highly rated classes in my psychology department (i.e., on a 5-point scale, the mean rating of course and instructor are 4.8 and 4.9, respectively).

As further testimony of its instructional utility, the article in which I first described this approach (Simonton, 1994b) was subsequently reprinted in the second edition of the *Handbook of Demonstrations and Activities in the Teaching of Psychology* (Ware & Johnson, 2000, vol. 1, pp. 302-305).

Perhaps as psychologists discover increasingly more about what it takes to become a great psychologist, this “psychology of science” assignment will become more widely disseminated in history of psychology courses. I believe that it is an excellent way to instruct undergraduates in both history and science.

Graduate Training

Undergraduate majors are often required to take a course in the history of psychology, but it is rare for such a course to be an integral part of a psychology graduate program, except in those few programs that offer higher degrees in the field. Yet I would argue that the history of psychology, when combined with the psychology of science, could make a very critical contribution to graduate training. Besides suggesting fascinating and significant research questions for doctoral dissertations, a scientific history of psychology could contribute to both professional and personal advancement. I must confess at once that these contributions are highly speculative, and perhaps they constitute pure fantasy. Still, the possibilities deserve exploration.

Professional: Psychology as science. A PhD in psychology is, like all doctorates, a research degree. The degree is awarded to students who have learned how to make an original scientific contribution to the field, as represented by their doctoral dissertation. For many psychology PhDs this will be their last contribution to psychological science – particularly those new doctorates heading toward practice. Yet for other students the graduate training will provide the foundation for entire careers dedicated to scientific inquiry. It is for this reason that so much of graduate education is devoted to mastering the latest theories, the most current (“hot”) research topics, and the most leading-edge techniques of measurement and analysis. The graduate student must learn the do’s and don’ts of scientific research. So, how do those active in graduate education really know what works and what does not? What are the optimal theoretical and methodological approaches for the advancement of science? What is it that the graduate students must acquire in route to becoming outstanding scientists in their own right?

One response is to have graduate students become familiar with the philosophy of science (e.g., Danto & Morgenbesser, 1960). Philosophers of science have been writing prescriptions about how to do great science ever since the days of Francis Bacon and Rene Descartes. Yet how do the philosophers know what to prescribe? After all, the philosophers usually formulate their prescriptions on a priori grounds – based on logic rather than on data. Descartes, for instance, supposedly deduced the rules of his “method” from first principles. Ironically, this very approach appears to contradict the whole spirit of the scientific enterprise. The scientific revolution was in no small part a reaction to the a priori reasoning of the Scholastic Philosophers. Instead of relying on what had to be true “logically” – like the existence of God or the immortality of the soul – the early scientists proposed direct appeals to nature. These appeals took the form of systematic observation or experiment. Perhaps the same empiricist approach can provide the foundation for a “philosophy of science” based on fact rather than theory.

This position was taken by Paul Meehl, the distinguished clinical psychologist (Meehl, 1992; also see Faust & Meehl, 1992). Meehl has long been critical of the methodologies that often dominate the discipline (e.g., Meehl, 1978, 1990a, 1990b). In his classic article on “Theoretical Risks and Tabular Asterisks: Sir Karl, Sir Ronald, and the Slow Progress of Soft Psychology,” Meehl (1978) lamented that it is simply a sad fact that in soft psychology theories rise and decline, come and go, more as a function of baffled boredom than anything else; and the enterprise shows a disturbing absence of that cumulative character that is so impressive in disciplines like astronomy, molecular biology, and genetics. (p. 807)

To make sure that psychology eventually shows the same cumulation of knowledge that is so conspicuous in the “hard” sciences, it is necessary to adopt the most rigorous methodologies. It is at this point that a scientific history of psychology may come into play. Meehl (1992) has persuasively argued for the need to develop a “cliometric metatheory,” that is, an “empirical, history-based philosophy of science” (p. 339). In essence, this would entail the application of historiometric methods to episodes drawn from the history of science. By applying appropriate “actuarial” methods, the outcome would be a determination of what theoretical and methodological approaches have the highest likelihood of advancing science. Meehl’s cliometric metatheory would establish what works best empirically rather than attempt to do so analytically. This could resolve numerous enigmas about how to do great science. To what extent does a scientist’s “confirmation bias” help or hinder scientific progress? Does having a strong theoretical basis for empirical research increase or decrease the odds of making important

discoveries? When is quantification appropriate and when is it premature or misleading? On what occasions is a holistic perspective superior to an atomistic one? The historical record, if properly analyzed, may contain some or all of the answers.

Of course, the development of Meehl's cliometric metatheory would not be easy. Indeed, the successful creation of such a discipline might itself be considered a substantial scientific achievement. Moreover, there is no guarantee that psychologists would reform how they train their graduate students along the lines suggested by any results. Yet, according to the oft-quoted remark of philosopher George Santayana, "those who cannot remember the past are condemned to repeat it" (quoted in *Who Said What When*, 1991, p. 211). Hence, psychologists should realize that by adopting a scientific approach to psychology's history, they might make the future history of psychology more scientific.

Personal: Psychologist as scientist. The historical record contains more lessons than just what theories and methods have proven most useful. History also records the lives and careers of those who have made notable contributions to science. The historiometric study of these data, when joined with psychometric studies of eminent contemporaries, can thus provide a complete psychology of distinguished scientists, great psychologists among them. Besides the intrinsic interest of this metascientific knowledge, the resulting research literature would probably have practical implications for graduate education. One application might be the identification of the most promising scientific talents for admission into graduate programs. The more we know about the developmental and dispositional correlates of scientific success as a research psychologist, the less hit or miss the selection process needs to be. For instance, if there are certain personality traits that are most strongly associated with scientific eminence, these traits might be useful supplements to the indicators of promise in current use (see, e.g., Gough, 1992). To be sure, psychologists of truly historic stature are so relatively rare that the odds of any graduate program admitting a notable-to-be must be rather small. Even so, it would be wise to use any reasonable means at our disposal to increase the likelihood of that happening. At the very least, many of us involved in graduate education would love to see one of our former students become one of the discipline's genuine stars.

Even if the foregoing suggestion turns out to be hopelessly impractical, there is another, more personal application of this metascientific literature. Much discussion in chapter 13 was allotted to the developmental impact of role models and mentors. Although graduate advisors would certainly provide mentors, and various active researchers might serve the function of role models, these do not exhaust the potential sources of career guidance. It also may be helpful to possess a generic picture of what it takes to become a successful contributor to psychological science. That is, a nomothetic profile of the great psychologist might provide a young aspiring talent with a more secure basis for social comparison than any single psychologist, however great. This profile would offer a comparative baseline not only during graduate training, but throughout the subsequent career course besides. The profile would provide responses to questions like the following.

Under whom should I study, the well-established senior scientist or the promising younger scientist? Would it really help if my mentor was the same race or gender as I? How much should I be publishing as a graduate student? At what age should I expect to finish up my degree and at which institutions should I end up? When should I get married and raise a family? How conscientious must I be about my teaching? Should I take on those administrative duties or found a new journal? Is it more critical for me to focus on a single question at any one time or is it more advantageous for me to work on several projects at once? Do those rejection letters and unnoticed publications mean that I am a failure, or do they mean I'm ahead of my time? Should I collaborate on this project or solo author as much as possible? When should I start writing books at the expense of journal articles? How critical is it that I attend this convention or that conference? What are the chances of my work being anticipated by another researcher? When in my career should I get inkling of whether I am going to leave my own imprint on the discipline? How do my accomplishments compare with notable psychologists both past and present? What honors should I reasonably expect given my publication record and citation visibility? Which qualities and experiences should I look for in the graduate students whom I decide to

mentor? What kinds of tips and pearls of wisdom can I give those of my students who aspire to become great psychologists?

Needless to say, the contemplation of these questions can become normative, and not just comparative. The young psychologist can strive to live up to implied expectations. As a consequence, the generic picture of the great psychologist might promote the appearance of new great psychologists. If so, the scientific study of psychology's history may increase the chances that the discipline will have a prominent place in the history of science well into the future.