1 What Makes a Psychological Scientist "Eminent"?

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The chapters in this book represent the contributions of more than 100 eminent psychological scientists, but they also represent the work of countless other individuals who have supported these scientists in their work. Almost any time one speaks of eminence, one really is speaking of the work of a team of people – not only the great psychological scientists, but also the collaborators and support staff who made their work possible. Almost all – perhaps all of the eminent psychological scientists represented in this book – would view the success of their students as among their greatest accomplishments. At the same time, they would recognize that they could serve only as mentors – that it was the students themselves who, to a large extent, lifted themselves up by their own bootstraps. If you are a student reading this book, you have the opportunity to come to represent the next generation of eminent psychological scientists.

When I was a graduate student, I often wondered how I could get from where I was as an unknown quantity to where eminent scientists like my advisors (Gordon Bower and Endel Tulving, both of whom authored chapters in this book) were. I was not even sure, at that point, what it was that the field of psychological science looked for to recognize a scientist as "eminent." The final chapter of this book discusses some of the *characteristics of scientists* in this book who have achieved eminence. This chapter, in contrast, discusses the *characteristics of the work of these scientists* that have led the scientists to achieve eminence. So, if you are a student, these are some of the goals you may have for the work you do, if indeed your goal is to achieve eminence in the field. Put another way, these are some of the goals to seek if you might want to be in the next generation of eminent scientists like those in this book. Of course, these goals could apply to any field, but this essay considers goals as they apply in psychological science.

Impact

Impact refers to the influence a scientist's ideas have on a field of endeavor – essentially, the force of the ideas in terms of changing the ways

people think or the things people do. Impactful work changes a field (hopefully for the better!). Many scientific articles are published in a given year, but the large majority of them change the field little, if at all.

There are different ways to have impact. My colleagues James Kaufman, Jean Pretz, and I have categorized some of the ways in which impact can be achieved. Some scientists have impact by moving current paradigms forward in leaps and bounds. Other scientists change the direction in which a field is moving. And still other scientists propose that in the future the field has to start over – that currently it is moving in the wrong direction. For example, the cognitive psychologists of the late 1950s and early 1960s – individuals such as Herbert Simon, Jerome Bruner, and George Miller – suggested that psychology had to start over in the way it conceived of thinking, moving from the Skinnerian emphasis on contingencies of reinforcement to an emphasis on the mental processes that go on inside the head when an individual is learning, remembering, or thinking.

Low-impact work is not work people disagree with; it is work that people do not even bother to cite because they do not believe it of sufficient importance to talk about it. Sometimes, scientists can get so caught up in the desire to publish that they forget that it is important not just to publish, but also to publish work that will somehow influence the field.

Quality

Quality refers to the excellence of scientific work, usually relative to other work being done in the field. Although one can think of some kind of "absolute" rather than "relative" quality, it is hard to know what "absolute" quality would mean. For example, what we could expect in terms of quality of work done in 1816 would be different from what we could expect in terms of quality in 2016. The techniques and lab equipment available in 1816 simply were not up to the standards of 2016, so one could not judge the quality of work done then by the same standard as might be used today.

Quality involves many different components. Perhaps the most important ones are the size, scope, and importance of the problem one is studying. Does one seek to study big important problems or just tiny unimportant ones? A second component is how well one studies the problems one chooses – does one study them in a rigorous and elegant fashion, or in a sloppy ill-considered way that makes it difficult to draw conclusions? A third component is how well one communicates one's data. Does one recognize what is important in one's data, and present it so

people can understand it, or does one communicate in a way that no one can or wants to understand, with the result that the work never achieves its potential?

Why separate quality from impact? Because not all work of excellent quality is extremely high impact. The impact of work will depend in part upon how many scientists work in a given field. If a particular scientist is working in a field with many other scientists in it, it will be easier to achieve impact than if that scientist is working in a smaller field where there simply are not as many other scientists likely to cite the work. A scientist could do elegant, innovative, and top-quality work that just happens to be on problems different from those of interest to many other scientists, and we would not want such scientists to be viewed as inferior because they choose to explore problems less studied by others.

Quantity

Quantity refers simply to the amount of work that a scientist has produced. More eminent scientists, on average, have produced a greater volume of work than less eminent scientists. They are not "one-idea" scholars who have a great idea, only then to disappear into obscurity. Rather, they keep coming up with new ideas that keep them productive.

Some scientists cast a skeptical eye on the idea of quantity, believing that highly productive scientists, at least in terms of quantity of work, often turn out lots of articles or books that are of lesser quality. But Dean Simonton, one of the foremost scientists of all time in the field of creativity, has shown this folk conception of quantity to be a myth. In fact, there is a high correlation between quality and quantity in scientific work. They are not the same, of course. But the idea that there are marvelously deep thinkers out there who produce only a small quantity of profound work does not hold up to empirical analysis. Certainly there are some low-quantity producers who do work of top quality. And there are mass producers who turn out junk. But for the most part, the two characteristics – quality and quantity – are highly correlated, and eminent people have lots of ideas rather than just a few. On the whole, eminence tends to result from many excellent ideas, not just one or two.

Visibility

Visibility refers to the extent to which scientists other than oneself are aware of one's work. Scientists achieve visibility by publishing in widely read (and usually high-quality) journals, by giving conference presentations or posters, by giving colloquia in a variety of settings, by sometimes

having their work picked up by the media, and so forth. Visibility is different from quality or impact. Someone can be highly visible for doing inferior work. For example, a medical researcher, Andrew Wakefield, achieved great visibility by falsely claiming to have shown that childhood vaccinations are linked to autism. But, for the most part, visibility is correlated with eminence. More eminent researchers tend to be ones that scientists, and sometimes laypeople, have heard about. And to achieve impact, one often needs visibility so that other scientists are aware of one's work and thus are in a position to cite it.

Measurement of Eminence

Eminence can be measured in a variety of ways. Diener and his colleagues, whose work formed the basis of selecting authors for the chapters of this book, used certain measures. Other scientists might have chosen other measures. There is no one set of universally agreed-upon measures of eminence.

The most common measure is simply the number of times the work of a scientist is cited. Are other scientists recognizing the work? Are they using it in their own work? Number of citations does not signify that individual scientists agree with the ideas or findings in the research. They may disagree with the work, perhaps strongly. Rather, it indicates that the scientists believe the work is worthy of notice and of being referenced.

There are other measures of eminence besides number of citations. One is a measure called the *h*-index, which refers to the number, *h*, of publications of a scientist that have been cited at least *h* times. So, a scientist with an *h*-index of fifteen would have fifteen publications that have been cited at least fifteen times. A second is a measure called the *i-10* index, which is the number of publications that have been cited at least ten times. Another way to measure eminence is to assess the extent of coverage of a scientist's work in textbooks – the vehicles for transmitting scientific ideas and research to the next generation. There are many other measures as well.

All measures of eminence are imperfect. A scientist may be cited because his work is bad ("Don't do what Professor X did!") or because his views are controversial ("It's hard to believe that Professor X can hold to these beliefs!"). But for the most part, if one views the measures only as advisory and uses several of them in conjunction (e.g., total number of citations, *h*-index, and *i-10* index), one can get some idea of a scientist's impact. In the end, what matters is not one particular index or another, but something harder to pin down: just how much a scientist's work has changed the way people think and act in a field.

It is important also to realize that none of the measures of eminence are completely "fair." Scientists have had lesser citation rates at various times in history (perhaps including the present) because of their gender, religion, race, nationality, or ethnicity, or because they were at less widely recognized institutions. In assessing the eminence of an individual scientist, one must realize that indices such as the *h* or *i-10* are no substitutes for considered judgment.

Do you want to become an eminent scientist like the ones in this book (and also like the many eminent scientists not represented in the book)? If so, think about some of the characteristics that make scientists in this book eminent. Think about impact, quality, quantity, and visibility. And think about one other thing: scientific ethics. Nothing destroys a career, even an eminent one, faster than unethical behavior in scientific work. So, accomplish your goals whilst always adhering to the highest standards of scientific ethics.

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