Let's Look at the Big Picture:
A System-Level Approach to Assessing Scholarly Merit

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Abstract

When judging scientific merit, the traditional method has been to use measures that assess the quality and/or quantity of an individual's research program. In today's academic world, a meritorious scholar is one who publishes high quality work that is frequently cited, who receives plentiful funding and scientific awards, and who is well regarded among his or her peers. In other words, merit is defined by how successful the scholar has been in terms of promoting his or her own career. In this commentary, I argue that there has been an overemphasis on measuring individual career outcomes and that we should be more concerned with the effect that scholars have on the scientific system in which they are embedded. Put simply, the question we should be asking is whether and to what extent a scholar has advanced the scientific discipline and moved the field forward collectively.

Why do we care about judging scientific merit? From an academic perspective, there is some need to have a system for determining whether to award tenure and promotion to faculty members. This has led to the development of criteria and indices used to judge and measure the scholarly merit of individuals. Although this practice makes sense if one is a department chair or a member of a promotion and tenure evaluation committee, it makes much less sense from the perspective of science. Science is a collective enterprise whose goal is to explain and understand the natural world and to build knowledge. Science cares about advancements and discoveries, not about individuals. From the perspective of a scientific system, individual scientists are valued to the extent that they help further the goals of the collective system. Although scientists can advance science in a multitude of ways, academic assessments of scientific merit focus narrowly on individual research output. I argue that we need to take a broader view of scientific merit and assess merit at the system-level.

As a system, science is comprised of lab workers, scientists, institutions, agencies, and the broader society in which they are all embedded. The various parts of the system work together interdependently and synergistically to build scientific knowledge (Forrester, 1968). A useful analogy is that of a bee hive. In a hive, worker bees, drones, the queen bee, the beekeeper, and the environment operate together to produce honey. The important outcome for assessment is the amount of honey produced by the hive. If an individual bee is evaluated, it is evaluated in terms of its relationship to honey production. Does a particular bee positively contribute to the hive's survival and honey production? Note, however, that individual honey output is not the measure of interest and indeed some critical parts of the system (e.g., drones, the beekeeper) do not produce honey directly. However, their presence makes the entire system function more efficiently and productively. Taking a similar approach to assessing scientific merit would entail

a shift from assessing individual scientific output to measuring how individual scientists influence other parts of the scientific system as well as the overall output of the system.

Assessing a Scientist's Influence on the Scientific System

Research on the factors that contribute to scientific discoveries (for a review see, Feller & Stern, 2007) has identified the following as key factors leading to sustained scientific progress: the quality of research facilities, the level and diversity of research funding, the supply of researchers (number, age, and creativity), and the organization of the research program (e.g., the disciplinary mix of researchers and the structure of the research team). In general, fields that draw in a large and steady supply of young active researchers are likely to realize scientific advancements more quickly than those that fail to do so (National Research Council, 1998). At the organizational level, the features that facilitate scientific discovery include organizational autonomy, organizational flexibility, moderate scientific diversity, and frequent and intense interaction among scientists with different viewpoints (Hollingsworth & Hollingsworth 2000; Hollingsworth, 2003). An individual scientist can contribute to scientific discovery directly through his or her own scientific products or indirectly by positively influencing these other aspects of the system. For this reason, I propose the following as additional indicators that can be used to assess scientific merit.

Increasing the Supply of New Researchers

Almost every academic psychologist that I know has a story about what drew them into the field of psychological science. These stories usually begin with the name of a professor, and often the same names emerge. Academic scientists vary in the extent to which they inspire others to pursue scientific careers. This may be due to differences in the amount of explicit encouragement provided or due to factors such as the scientist's own level of enthusiasm.

Regardless of the exact mechanism, because the size of the pool of active researchers is critical for scientific progress, those scientists that increase the supply should be rewarded more than those that decrease the supply.

Increasing the Productivity of Other Scientists

During my time in graduate school at Ohio State University, the lab groups were quite large and the more senior graduate students would help train the incoming graduate students. Some graduate students were particularly good at this role and the output of the entire lab would skyrocket as a result. These graduate students not only conducted their own personal research, but their presence in the lab facilitated the scientific progress of others. Beyond graduate labs, scientists promote the productivity of other scientists by reviewing manuscripts, sharing data, creating and serving on scientific organizations, and developing scientific tools and paradigms that can be used by others. A good example of the latter is the development of the Cyberball paradigm to study ostracism (Williams & Jarvis, 2006). As of 2016, there have been over 240 published papers of studies using Cyberball. The availability of this research tool not only attracted researchers to the study ostracism but also made it relatively easy for them to carry out their work, thus increasing the pace of scientific progress in this area. Metrics that can capture this type of contribution to science are needed and should be used as indicators of scientific merit.

Increasing the Transmission of Information

In 2003, the National Science Foundation (NSF) announced its program to fund Science of Learning Centers. The goal of the program was to invest in large-scale, long-term centers that would create diverse and multidisciplinary environments for studying questions related to the science of learning. By creating centers, the NSF hoped to foster the transmission of scientific

information and thus speed scientific progress. Although individual research scientists typically do not have the resources to create large research centers, they can organize conferences and symposia, create and contribute to scientific discussion platforms, and make their research protocols and data easily shareable. While these types of activities are often seen as relatively minor, information transmission is a critical component to scientific progress and scientists should be evaluated in terms of their contribution in this area.

Making the Field a Better and More Productive Place

The term “eminent scholar” is usually reserved for the small subset of scholars within a field that are highly successful, well-known, and respected. I would like to suggest that the term might be applied equally well to those scholars that contribute to scientific progress by improving the integrity of a scientific discipline. Indeed, when I have reflected on whom I consider to be my scientific heroes – the scholars that I respect and admire the most – the individuals that come to mind first are those that have not only produced important individual scientific works, but have also created norms and values that have positively shaped the discipline. One might think of these individuals as scientific beekeepers. They help to ensure the overall functioning of the system so the individual scientists and the field as a whole can flourish.

Conclusions

Scholarly merit in psychological science has been determined primarily by the productivity of individual researchers. Notably absent are indicators of merit that assess an individual’s system-level contributions. To advance science, we need to acknowledge, assess, and reward these contributions as well.

References

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