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Early career grants, performance, and careers: A study on predictive validity of grant decisions

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ABSTRACT

The main rationale behind career grants is helping top talent to develop into the next generation leading scientists. Does career grant competition result in the selection of the best young talents? In this paper we investigate whether the selected applicants are indeed performing at the expected excellent level—something that is hardly investigated in the research literature.

We investigate the predictive validity of grant decision-making, using a sample of 260 early career grant applications in three social science fields. We measure output and impact of the applicants about ten years after the application to find out whether the selected researchers perform ex post better than the non-successful ones. Overall, we find that predictive validity is low to moderate when comparing grantees with all non-successful applicants. Comparing grantees with the best performing non-successful applicants, predictive validity is absent. This implies that the common belief that peers in selection panels are good in recognizing outstanding talents is incorrect. We also investigate the effects of the grants on careers and show that recipients of the grants do have a better career than the non-granted applicants. This makes the observed lack of predictive validity even more problematic.

1. Introduction

An important question about peer and panel review is the predictive validity: does the *post*-performance of selected researchers or selected projects legitimize their selection? Do the selected researchers perform better than those that were not selected? But why would peer and panel review of grant applications successfully select the best applicants and projects? Basically, this is based on Merton's sociological theory about scientific norms (Merton, 1973), which are expected to regulate researchers' behavior. According to this functionalist theory, scientific norms such as CUDOS[1] (should) govern the science system, and social factors that interfere with these norms should be avoided through a correct organization of selection processes. Then one may expect reviewers and panel members collectively trying to select the best researchers and the best proposals. Of course, one needs to realize that the decision-making process remains uncertain (Cole, 1992) — also

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[1] According to Merton, scientists should follow the norms of "Communism, Universalism, Disinterestedness and Organized Skepticism" (Merton, 1973 [1942]).

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when decision makers are governed by the mentioned scientific norms. But one would expect a reasonable level of correct decisions, and consequently a reasonable predictive validity.

On the other hand, peer review and panel decision-making are social processes. Nepotism and sexism have been shown to characterize the system (Wennerås & Wold, 1997; Sandström & Hällsten, 2008; Sandström & Wold, 2015). Social–psychological theories about decision-making are relevant in this context. A whole set of social and psychological factors do influence academic decision-making, as is supported by much experimental research (Olbrecht & Bornmann, 2010; Van Arensbergen, van den Besselaar, & van der Weijden, 2014a), as well as by anthropological studies (Lamont, 2009): self presentation (Lamont, 2009), conformity, stereotyping (token-theory; Kanter, 1977), group-think (Esser, 1998), but also self interest and group interests (Tindale, Meisenhelder, Dykema-Engblade, & Hogg, 2001), as well as political coalitions. Furthermore, it has been shown that the organization of the selection process influences the dynamics and the outcomes (Langfeldt, 2001), such as having or not having an interview (Van Arensbergen & Van den Besselaar, 2012). These different mechanisms can be expected to work simultaneously, and which dominate depends on the context. It may also differ between research fields, and between different funding instruments. For example, one would expect that when resources are scarce, and the amount of high qualified and suitable candidates is high compared to the available grants, the probability that extra-scientific criteria come in increases, and interests and power may be more important. But when resources are larger and the success ratio is higher, norm-oriented behavior may dominate.

Unfortunately, data to investigate predictive validity are scarce — it is notoriously difficult to get data about *rejected* applicants and applications. Not surprisingly, a recent review of research on peer review (Bornmann, 2011) could only identify a handful of studies about the predictive validity of grant peer review (Armstrong, Caverson, Adams, Taylor, & Olley, 1997; Bornmann & Daniel, 2006; Bornmann, Wallon, & Ledin, 2008; Bornmann, Leydesdorff, & van den Besselaar, 2010; Van den Besselaar & Leydesdorff, 2009; Hornbostel, Böhmer, Klingsporn, Neufeld, & von Ins, 2009). Recently, a few other studies have been published, indicating the growing interest in the subject (Reinhart, 2009; Campbell et al., 2010; Benda & Engels, 2011; Neufeld & von Ins, 2011; Neufeld & Hornbostel, 2012; Neufeld, Huber, & Wegner, 2013; Van Leeuwen & Moed, 2012; Cabezas-Clavijo, Robinson-García, Escabias, & Jiménez-Contreras, 2013; Mutz, Bornmann, & Daniel, 2014; Decullier, Huot, & Chapuis, 2014; Danthi, Wu, Shi, & Lauer, 2014; Kaltman et al., 2014; Saygitov, 2014). The studies cover a variety of countries (US, Canada, Netherlands, Germany, France, Spain, Austria, Switzerland, Russia), the European Union (ERC) and other international organizations (EMBO). Interestingly, half of the studies were published in 2013 and 2014, showing that the issue gets more attention recently. In Table 1, we have summarized the studies on a few dimensions, relevant to our analysis.

What do these studies show? A first observation is that all studies relate the grant decision to publication and citation indicators, and to this end many use the journal impact factor or the *h*-index. In this paper, we also limit ourselves to publications and citations, and we discuss this methodological decision in Section 3.

Second, while most studies focus on granted versus non-granted *researchers*, there are others that focus on granted and non-granted research *projects*. The latter studies are to some extent problematic, as non-granted projects are difficult to study, specifically as they are not always carried out, and when carried out difficult to identify. The studies focusing on projects [16–18 in Table 1] indeed do not compare granted projects with non-granted, but try to establish whether the panel scores correlate with post performance in terms of publications and citations. Study [15] is different as it compares ex-ante panel evaluation scores with ex-post panel evaluation scores. This study only has evaluation scores for the granted projects, and the researchers had to 'impute' scores for the non-funded projects. Here the positive conclusions about predictive validity completely depend on the assumptions in the imputation procedure. Although the study is presented as an empirical one, the contribution is in fact methodological, and therefore we discard it here. The three other studies either do not find a correlation between review scores and performance [17, 18] or a weak correlation [16], suggesting many type-2 errors (very good projects that were not funded).

Third, quite a few studies correlate the granting decision in fact with *past performance*, and not post performance [1–5]. In some cases, citations were counted until a date after the grant was received, but these citations related only to publications written before the application [e.g., 2]. These studies on the relation between past performance in terms of citations and publications do point in several directions. Sometimes one finds a positive correlation between receiving grants and performance, sometimes not. As the number of studies is low, it is difficult to see patterns. Here we formulate the assumption that at least two characteristics of these studies are important. First of all, the selection of the contrast groups is crucial. The more restrictive the group of non-granted is, the less we expect to find performance differences with the successful applicants. Second, the higher the success rate, the larger the probability of finding a different performance between the granted group and the non-grated group.

Fourth, a number of papers do relate funding to post performance. These studies differ in several aspects, especially in terms of the post performance period. Most cover only a short period, such as only the project period, or the project period plus one year [6–9], some cover a slightly longer period, such as three years after the project ended [10–12], and others have a reasonable long period up to 9 years [13, 14]. This may influence the findings considerably. With short periods, one may not have captured the full effects of the grant, but with a long period, the effects one may measure could easily be influenced by e.g., other grants obtained in the meantime. The probability of these other influences may differ depending on the career phase of the researchers involved. We expect that early career researchers have fewer opportunities for additional funding, and this group may therefore be more suitable for studies on predictive validity of grant selection procedures.