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Partial lottery can make grant allocation more fair, more efficient, and more diverse

Serge P. J. M. Horbach 1,*, Joeri K. Tijdink 2,3 and Lex M. Bouter 3,4

¹Danish Centre for Studies in Research and Research Policy, Aarhus University, Bartholins Allé 7, Aarhus 8000, Danmark, ²Department of Ethics, Law and Humanities, Amsterdam University Medical Centers, Vrije Universiteit, De Boelelaan 1105, Amsterdam 1081 HV, The Netherlands, ³Department of Philosophy, Faculty of Humanities, Vrije Universiteit, De Boelelaan 1105, Amsterdam 1081 HV, The Netherlands and ⁴Department of Epidemiology and Data Science, Amsterdam University Medical Centers, Vrije Universiteit, De Boelelaan 1105, Amsterdam 1105, Amsterdam 1105, Amsterdam 1081 HV, The Netherlands and ⁴Department of Epidemiology and Data Science, Amsterdam University Medical Centers, Vrije Universiteit, De Boelelaan 1105, Amsterdam 1081 HV, The Netherlands

*Corresponding author. E-mail: s.horbach@ps.au.dk

Abstract

We call on research funding organisations to experiment with different models for integrating partial randomisation into their grant allocation processes as well as to assess the feasibility, the potential implications, and the perceptions of such models. Traditional models of grant allocation have usually been based on peer review to rank applications and allocate grants. These models have been shown to suffer from various shortcomings. In particular, we believe that partial randomisation holds the potential of being more fair, more efficient, and more diverse. In addition, it may lead to more responsible research practices. We outline a proposal for such a grant allocation process and sketch various arguments in favour of it. We also address potential counterarguments and conclude that partial randomisation holds the potential to lead to many benefits and therefore warrants further experimentation and implementation.

Key words: partial randomisation; lottery; research funding; responsible research practices.

Funding decisions are at the core of science and its regulation. Who gets the money to do research largely determines the path along which science and academic careers progress. However, deciding which grant applications, research teams, or individuals are most worthy of funding is not an easy task. Traditionally, funding organisations use a competitive model based on peer review to rank applications and allocate grants. Many applications that qualify for funding have to be rejected. The decreasing success rates and the resulting increased pressure on applicants, reviewers, and grant committee members alike made clear that the current system suffers from various drawbacks. These include, but are not limited to, being biased, unreliable, resource demanding, and inefficient (e.g. Gildenhuys 2020; Guthrie et al. 2017; Roumbanis 2020). It has also been shown that traditional grant decisions favour applications from established researchers and institutions and rarely award out-of-the box ideas and replication studies (Bol et al. 2018; Guthrie et al. 2019; Luukkonen 2012). In addition, the demonstrated low levels of inter- and intra-reviewer agreement cast doubt on the system's ability to reliably and consistently select the best applications (Mayo et al. 2006; Pier et al. 2018). We therefore propose an alternative system based on randomisation as a complement to peer review. We subsequently outline the benefits of such a system and address potential counter-arguments against it.

1. The proposal

To address this issue, we argue that a system of partial randomisation in grant allocation should be more widely experimented with. Even though the uptake of randomisation in research funding is still in its infancy, some initial experiments have been performed (e.g. Bendiscioli et al. 2021; Liu et al. 2020). Along the lines of these experiments, we propose a system in which an initial round of peer review is performed to identify applications that qualify for funding. This serves to distinguish the chaff from the wheat. Based on the peer reviewer scores, all applications that do not meet the criteria for quality, relevance, or feasibility and are hence unworthy of funding should be rejected. Similarly, a small fraction of applications that are, more or less unanimously, considered to be top-class research should be immediately granted. The remaining applications, which all qualify for funding, should enter a lottery system in which applications are selected at random. The operationalisation of the criteria and the cut-off points, i.e. the share of applications that can be immediately funded or should be excluded from the lottery, should be specified a priori and be closely aligned with the funding programme's aims and characteristics. Proposals for introducing partial lotteries to grant funding schemes are not new, with discussions starting already several decades ago (Greenberg 1998; Avin 2019). By now, several pilots of the use of lottery in grant allocation have been run, including by the VW Foundation, The Swiss National Science Foundation (Bendiscioli et al. 2021), and The Health Research Council of New Zealand (Liu et al. 2020). We also propose to share the results of all steps of the process. This transparency can help researchers who were not selected for funding during the lottery but had an application that qualified for funding to add to this to their curriculum vitea. On a psychological level, this may support them because the core message

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is your application was unlucky, instead of it was not good enough. Similarly, applicants who were selected receive the message 'your application qualified for funding and it was lucky', potentially helping them to avoid overestimating their brilliancy.

To optimize the fairness of partial randomisation, it seems advisable to make the successful applicants ineligible to submit a new application for the granting programme at issue until the final year of the awarded project. Another rule could be that applications that were unsuccessful in the lottery can be resubmitted once in the next rounds of the granting programme.

2. The benefits

Several arguments underpin our plea for partial randomisation of research grants. We believe our proposed system to be more *fair* and more *efficient* than the traditional approach and we take the view that it also will lead to more *diver*sity. Moreover, our proposal decreases incentives to engage in questionable research practices (QRPs) in the application process, thereby potentially leading to more responsible research. We believe that using lottery both *directly* lowers the incentives to engage in QRPs in grant writing, such as overselling or misrepresenting past research, and *indirectly* decreases the likelihood of researchers engaging in other QRPs through its more efficient grant allocation and decreased burden on researchers and reviewers. Since a shortage of resources, a perceived high pressure for academic output and high expectations to be successful in getting grants (Gopalakrishna et al. 2022) have been hypothesized to be substantial drivers of irresponsible research (e.g. Haven et al. 2019), such an indirect effect may have far-reaching benefits.

Regarding *fairness*, we believe our proposed system leads to a more transparent and balanced process of funding allocation. Whereas traditional approaches have demonstrated to suffer from bias and undesirable accumulation of grants in a small proportion of applicants (i.e. the *Matthew effect*) (Bol et al. 2018; Merton 1988), lotteries are blind to such circumstantial features of applications or applicants. In addition, lotteries are transparent regarding the extent that 'luck' plays a role in decision-making, whereas traditional peer review systems hold the pretence of being solely merit-based. However, multiple studies have shown that peer review is not reliable when it comes to ranking applications that are worthy to be funded (e.g. Brezis and Birukou 2020). The traditional approach therefore inherently contains a substantial level of undesirable arbitrariness.

Regarding *efficiency*, we think the main gain rests in the fact that the system relieves grant committee members from the difficult task of having to differentiate among many applications that differ little in quality and all meet the criteria for being funded. This aspect was indeed found to lead to a reduction in the time required by committee members to deliberate about funding decisions (Bendiscioli et al. 2021). A partial lottery system may also mitigate the burden caused by resource-demanding appeal procedures by applicants who disagree with the motivation provided for the rejection of their applications. After all, it does not make sense to complain about 'bad luck'. We expect that not being successful in a lottery will no longer be perceived as 'failure'.

As for *diversity*, pilots with partially randomised grant allocation have shown to lead to more diverse applications,

e.g. proposals from a wider range of applicants, as well as to a more diverse landscape of topics of funded applications, including with respect to academic disciplines and research methodologies (Bendiscioli et al. 2021; Liu et al. 2020). Lottery seems to be a powerful antidote to the *Matthew effect*.

3. Alleged drawbacks of lotteries and how to overcome them

Several arguments may or have been raised against the introduction of full or partial randomisation in research funding. First, commentators have suggested that partial randomisation might lead to poorer quality applications, as researchers might take their chances, minimize their efforts, and only aim not to be excluded from the lottery. Hence, instead of aiming for the best possible application, they just aim for a minimally viable application to enter the lottery. This objection seems hitherto ungrounded, as early experiments indicate that applicants spend an equal amount of time preparing their application as in the traditional system (Bendiscioli et al. 2021).

Second, it is argued that funding allocation should be exclusively merit-based and that using randomisation might not award the most deserving researchers. This might subsequently reduce the credibility of the funding scheme, the prestige of the funded projects or the status of the funded applicants (Reinhart and Schendzielorz 2020). Again, we do not consider this a valid argument. We reiterate that traditional peer review models have difficulties reliably ranking applications worthy of funding (Guthrie et al. 2019; Mayo et al. 2006). Furthermore, it has been repeatedly shown that predicting the future impact of funded applications is hardly possible (Cole et al. 1981; Manske 1997). One could argue that lotteries merely formalise the element of chance that is already inherently present in traditional review and selection processes.

Third, it has been argued that researchers funded via partial randomisation might be stigmatised; their merit status might be undermined; and their careers negatively affected (Vindin 2020). Again, we would argue the opposite. As the element of chance is evident and equal for all, our proposed system might lead to a situation in which having an application that qualified for funding rejected after lottery might be added to a researcher's CV as a sign of merit. Hence, the system of partial randomisation might lead to a more fair distribution of credit.

4. Now is the time to follow suit

Deciding which research applications are most promising and of the highest quality and hence deserve to be funded is a daunting task, inherently engraved with considerable uncertainty and disagreement. A system of partial randomisation that formalises this unavoidable element of chance has various advantages. In particular, such a system will be more fair, efficient, and diverse and can incentivise researchers to engage in responsible research practices. In a context where researchers increasingly indicate to be open to the introduction of lottery elements in grant allocation (Philipps 2021), we herald the increasing number of funding organisations piloting partial lotteries and encourage others to follow suit.

In particular, we encourage funders to experiment with different models of integrating partial randomisation into their grant allocation processes as well as to assess the implications and perceptions of such models. In order to further increase efficiency, one could imagine including a first step in which from eligible concise pre-applications, lottery selects a limited number of applicants that are allowed to submit a full proposal. Subsequently, these full proposals are peer-reviewed. When there turn out to be more applications worthy of funding than the available budget allows, a second lottery can decide which applications will be granted. Such an approach will lower burdens substantially for applicants, reviewers, and selection committees. Regarding potential consequences of diverse lottery models, we are particularly interested in how it affects the extent to which researchers adhere to responsible research practices. Previous studies have indicated that researchers believe funding organisations' selection processes to strongly influence responsible conduct of research (Sørensen et al. 2021). The introduction of partial lottery models constitutes an excellent framework to study this and we applaud the funding agencies that study their own application processes to improve their methods.

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