RoRI RESEARCH ON RESEARCH INSTITUTE

RoRI Working Paper No.4

Experiments with randomisation in research funding:

scoping and workshop report

Edited by Helen Buckley Woods and James Wilsdon

August 2021

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For citation: Woods, H. B. & Wilsdon, J. (eds.) (2021) *Experiments with randomisation in research funding: scoping and workshop report.* RoRI Working Paper No. 4, July 2021. **DOI:10.6084/m9.figshare.16553067**

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1. A new mood for funder experimentation?

SCIENCE FUNDERS GAMBLE ON GRANT LOTTERIES

A growing number of research agencies are assigning money randomly.

By David Adam

Albert Einstein famously insisted that God does not play dice. But the Health Research Council of New Zealand does. The agency is one of a growing number of funders that award grants partly through random selection. Earlier this year, for example, David Ackerley, a biologist at Victoria University of Wellington, received NZ$150,000 (US$96,000) to develop new ways to eliminate cells – after his number came up in the council's annual lottery. "We didn't think the traditional process was

Worldwide, there is growing interest in applications of randomisation, or lottery-style mechanisms within the grant funding system, and a small but growing number of funders are now undertaking trials and experiments on various scales (Adam, 2020). This is part of wider moves in research systems towards experimentation and testing of methods of prioritisation, allocation and evaluation.

Several funders involved in such experiments are partners in the Research on Research Institute (RoRI), and through its workstream on randomisation, RoRI aims to support these and other partners as they plan, design, undertake and evaluate further trials of randomisation. We hope to facilitate closer alignment and learning from experiments that are underway or planned, enabling the RoRI consortium—and the research community—to build a richer collective and comparative picture of the pros, cons and possibilities of these and related approaches designed to test and improve methods of evaluation, assessment and allocation.

Fifteen RoRI partners are involved in this strand of work:

- Alfred P. Sloan Foundation
- Australian Research Council (ARC)
- Austrian Science Fund (FWF)
- Canadian Institutes of Health Research (CIHR)
- Chan Zuckerberg Initiative (CZI)
- Dutch Research Council (NWO)
- European Molecular Biology Organization (EMBO)
- Michael Smith Foundation for Health Research (MSFHR)
- National Institute for Health Research (NIHR)
- Novo Nordisk Foundation (NNF)
- Research Council of Norway (RCN)
- Swiss National Science Foundation (SNSF)
- UK Research and Innovation (UKRI)
- Volkswagen Foundation
- Wellcome Trust

These funders can broadly be divided into two groups: those who are already **designing, trialling and evaluating** uses of partial randomisation; and those who are **scoping and learning**, with a view to undertaking similar or related experiments at a later date.

This work aims to provide evidence and practical resources for funders interested in trialling randomisation in their processes of grant evaluation and allocation. The attraction of such approaches supposedly lies in a potential reduction of bureaucratic and administrative effort for involved parties (applicants, referees, funding administrators) without sacrificing the quality of funded research—leading to a more efficient funding system. In addition, some argue that randomisation offers an effective route to overcoming existing biases in funding decisions, for example against women, ethnic minorities, interdisciplinary research, or high-risk research.

The current interest in randomised approaches builds on longstanding concerns over the flaws and imperfections of expert peer review, and on a recognition that potential alternatives (for example, the use of metrics as proxies for certain qualities or impacts of research) often introduce problems of their own.[1] Rather like metrics, randomised allocation processes remain controversial in parts of the research system, as they are regarded as undermining scientific meritocracy.

Some reactions to randomisation in research funding

*"It would make it look like we don't know what we're doing." (*member of staff at an Australian funding agency, quoted in Barnett, 2016)

"Sure, some applications might flourish that otherwise would not, but what about the high-quality research that has been carefully constructed over time and is suddenly de-funded? Such a funding system is, in effect, anti-intellectual. It is a research version of publication bibliometrics that focus merely on citation counts, not on quality." (Beattie, 2020).

"As an early-career researcher, I might be expected to gain from such a system, given that I could land a windfall without having my case judged against the competition. But I want my career to be built on achievement, as recognized and promoted through conventional grant awards — not undermined by a lottery system." (Vindin, 2020).

"Arguing that lotteries are more efficient and could remedy the conservatism of peer review also risks overlooking the fact that a new system of control would be put in place…As a result, the question is not how we eliminate bias, but whether we prefer the biases of scientists over the biases of politicians and administrators." (Reinhart & Schendzielorz, 2020).

[1] For example, as discussed in the Leiden Manifesto http://www.leidenmanifesto.org/; The Metric Tide https://re.ukri.org/sector-guidance/publications/metric-tide/; and this RORI paper: Curry, S., de Rijcke, S., Hatch, A., Pillay, D., van der Weijden, I. and Wilsdon, J. (2020) *The changing role of funders in responsible research assessment: progress, obstacles & the way ahead.* RoRI Working Paper No. 3., November 2020. DOI: 10.6084/m9.figshare.13227914

By experimenting with randomisation in grant allocation, there is the potential to analyse effects at four different levels:

- **Bias**—whether random allocation results in different patterns of allocation (by discipline, institution, gender, career stage or other variables);
- **Burden**—the extent to which randomisation reduces burden and bureaucracy and burden, both on applicants and on the funding agency;
- **Legitimacy**—attitudes and perceptions within the wider research community and stakeholders to the introduction and use of focal randomisation
- **Outcomes**—whether random allocation results ultimately in projects with different impacts and outcomes, relative to other allocation modes. This is the most important level but also the hardest and slowest to study and measure.

RoRI's strand of work in this area will address this central research question: ***Drawing on ongoing trials of randomised grant allocation by research funders, to what extent can such approaches meet expectations of a more efficient and equitable funding system?***

Further sub-questions flow from this, related to the challenges that randomisation poses at a technical, organizational and cultural level:

Q1) How does randomisation fit into current practices of funding bodies and what adaptations in organizational routines and institutional culture would it imply?

Q2) How is the production of funding applications embedded in academic research practices and how can we expect current practices to interact/adapt to randomised grant allocation?

Q3) How can different variants of randomisation be expected to play out in practice, especially in regard to the expected gains in efficiency and fairness?

Why randomise?

The practice of using randomisation in decision making dates back to ancient Greece, and the use of lotteries to select citizens for political office. In modern research, randomisation is commonly associated with quantitative research methods, such as random (or probability) sampling, and experimental techniques, such as randomised controlled trials (RCTs). Over the past twenty years, RCTs or RCT-style approaches have become synonymous with movements for evidence based policy and practice, which began in medicine and have gradually extended into other fields, including education, criminal justice and international development (Oliver et al, 2008; Cowen et al, 2017). These methods have helped to foster an evidence-informed culture of testing and experimentation in many areas of decision-making, but have also been criticised for extending inappropriate models and assumptions into fields where these can be unhelpful or unethical.

In addition to motivations of fairness or efficiency, interest in randomisation forms part of a wider impetus towards experimentation among research funders, in order to evaluate the impacts of their investments (Azoulay & Li, 2020). The aim of this short paper is to summarise some of the latest research in this area, supplemented by partners' plans and experiences, which can support the RoRI consortium in designing and clarifying the objectives of its work—and in laying the foundations for further rounds of funder experiments beyond RoRI's pilot phase.

2. Randomisation in grant funding: a brief review

2.1 Methods

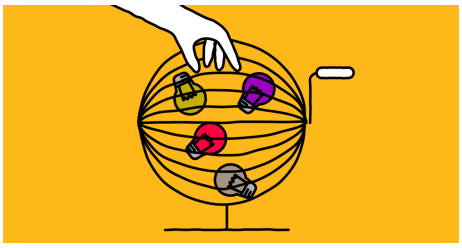


Image source: Nesta

As part of the scoping phase for this strand of RoRI's work, we reviewed evidence on the random allocation of research funding published in the last ten years, as a subset of more substantial bodies of literature on peer review and experimental research methods. Fifteen key studies are summarised in this section, which include modelling studies, review papers, surveys and theoretical research. We have organised this literature under three themes: definitions of focal randomisation; randomisation as a potential solution to problems with peer review; predictions, dilemmas and uncertainties.

2.2 Defining partial randomisation

All the ongoing funder experiments with randomisation involve some combination of expert peer review and chance to decide which projects or people are funded. To distinguish such approaches from processes which are entirely random (like winning a lottery), several funders use terms like 'focal randomisation' or 'partial randomisation'.

Partial randomisation is described variously in two or three stages. Typically, the initial stage involves basic screening for eligibility, followed by blind peer review or panel review by field experts. At this stage, applications which are obviously of low quality, poorly designed or unethical are discarded, while those which are exemplary may be funded immediately, or moved into a pool for further consideration.

The next stage sees the middle group of applications—where it is less straightforward to rank or determine relative qualities via peer or panel review—subject to a lottery process. Brezis (2007) highlights that in focal randomisation processes, all of the applications for a particular scheme are not pooled with winners chosen at random. Only a subset of applications are entered into the lottery stage—hence the 'focal' aspect of the process.

Liu et al. Research Integrity and Peer Review (2020) 5:3
https://doi.org/10.1186/s41073-019-0089-z

Research Integrity and Peer Review

RESEARCH Open Access

The acceptability of using a lottery to allocate research funding: a survey of applicants

Mengyao Liu[1], Vernon Choy[1], Philip Clarke[2], Adrian Barnett[3], Tony Blakely[4] and Lucy Pomeroy[1*]

Abstract

Background: The Health Research Council of New Zealand is the first major government funding agency to use a lottery to allocate research funding for their Explorer Grant scheme. This is a somewhat controversial approach because, despite the documented problems of peer review, many researchers believe that funding should be allocated solely using peer review, and peer review is used almost ubiquitously by funding agencies around the world. Given the rarity of alternative funding schemes, there is interest in hearing from the first cohort of researchers to ever experience a lottery. Additionally, the Health Research Council of New Zealand wanted to hear from applicants about the acceptability of the randomisation process and anonymity of applicants.

A number of funders have trialled or piloted schemes to assess the value and viability of this method. One prominent example is the **Health Research Council of New Zealand**

(HRC-NZ), which is the first funder to have trialled this method and published an initial evaluation **(Liu et al 2020)** of its acceptability and outcomes. The trial began in 2013 and continues to date. The method is applied to its Explorer Grant Project funding scheme, which aims to fund transformative research (exploring new fields, disrupting accepted ideas) on any health topic, regardless of discipline. Projects receive up to $150,000.

This is the first use of a randomisation method to allocate funds by a national funding agency. The HRC-NZ suggests that this is a fair and transparent method of allocating funds to equally eligible applicants, with the benefits of the randomisation method including: increased fairness and equity for fund applicants; a focus on ideas rather than applicants' track records; reduced workload for peer reviewers; and a simplified application process.

Liu et al. (2020) investigated these benefits in a survey of scheme applicants. All applicants from the inception of the award (2013) onwards were invited to participate (n=325), with a response rate of 39% (126 participants). Respondents were asked if they thought using a lottery approach was suitable, and if this new approach changed the way they made their application. Participants were supportive of the use of a lottery for this scheme, which supports transformative research (63%; n= 79), but less so for other types of award (40%; n=50 positive and 37%; n= 46 negative).

The respondents in Liu et al. (2020) were also supportive of the anonymisation of applications. There was an association between those who had won funding and those holding positive views about the use of random allocation. Those who had achieved funding were also more likely to support an extension of this approach into other grant types. The lottery method did not affect the amount of time people took to complete their application, possibly because of the initial round of peer review to establish eligibility for the award.

The authors conclude that the HRC-NZ's experience advocates further uptake of the partial lottery approach. In addition, given the dearth of research about research funding methods, and the limitations of the study (such as a low response rate and a lack of qualitative analysis methods), the authors recommend a further independently run study exploring randomisation methods across a number of funding agencies and schemes.

2.3 Randomisation as a potential solution to problems with peer review

Research funding is allocated in a variety of ways. These include government block funding allocated through large scale performance-based quality assessments such as the UK's Research Excellence Framework (REF) or Excellence for Research Australia (ERA); grants or fellowships awarded on the basis of expert panel review, or individual peer review; and more novel methods such as funding 'sandpits' or workshops.

In recent years, concerns have grown across many national research systems about the shortcomings of peer review, or the pressures being placed on the peer review system. **Bendiscioli (2019)** summarises these challenges, citing reviewer fatigue as a significant problem, as researchers are increasingly expected to spend time assessing grant applications, journal articles and monographs, ethics applications, conference abstracts and promotion and award proposals—without such activities typically being recognised or allocated sufficient time in workload models, Conservatism is highlighted as another flaw of peer review, with proposals that are perceived as higher risk more likely to be rejected. Further limitations may relate to reviewers' biases with regards to gender, race, nationality, disciplinary field, institutional affiliation and other characteristics of applicants.

Amongst potential ways to improve peer review, Bendiscioli (2019) suggests clearer guidelines should be provided for reviewers, underlining the aims of a given funding scheme, its evaluation criteria and highlighting ways to limit and manage bias. Training and guidance materials could be provided to make it clear what is expected of reviewers. Another potential solution is to anonymise applications to reduce bias in decision making.

More radical options proposed by Bendiscioli (2019) include: widening peer review to include patient or user panels, or feedback from the wider public; a DARPA-type model where a dedicated programme manager takes funding decisions and closely monitors progress of the portfolio of projects they choose to fund; focal randomisation; or making decisions based solely on past performance. The author cites various examples of all these interventions by different funding agencies. We have extracted these and other examples to create a summary table of interventions below.

Approach	Example publications	Example initiatives
Augmented or extended peer review	Bendiscioli (2019)	Medical Research Council (UK) published guidance (https://www.mrc.ac.uk/documents/pdf/reviewers-handbook/).
Decentralisation	Bedessem (2020)	Health Research Board Ireland. (https://www.hrb.ie/funding/funding-schemes/public-and-patient-involvement-in-research/).
Past performance	Gross & Bergstrom (2019)	The MacArthur Fellows Programme

		(https://www.macfound.org/programs/fellows/strategy/) Howard Hughes Medical Institutes (HHMI), (https://www.hhmi.org/scientists)
Focal randomisation	Brezis (2007	HRC (NZ); Swiss National Science Foundation (SNSF); Austrian Science Fund (FWF); Volkswagen Foundation.
Machine learning or artificial intelligence		Research Council Norway (RCN); Russian Science Foundation[2]
Active programme or portfolio manager	Bendiscioli (2019)	DARPA
Blinding / anonymisation	Liu et al (2020)	HRC-NZ; FWF; Velux Foundation's Villum Experiment.[3]

Summary table of alternative approaches to peer review, expanded from Bendiscioli (2019)

A number of other papers highlight inefficiencies in peer review. **Gross & Bergstrom (2019)** demonstrate through the economic theory of contests how the value of the research that is not done whilst a researcher is occupied with preparing a proposal for funding is close to or exceeds the value of the research the funding programme supports. The authors suggest either focal randomisation, or review based on past performance, as alternative approaches that will reduce inefficiencies.

Barnett et al. (2015) report on the results of two cross-sectional surveys of researchers in Australia who took part in a streamlined funding application process for medical research. Researchers were surveyed before and after participating in the streamlined process. The results showed that although the applications produced were shorter in the streamlined process they took longer to prepare. The amount of time spent may be determined by the amount of money available or the perceived level of competition.

Schroter, Groves & Højgaard (2010) surveyed a sample of 57 funding agencies in the field of biomedical research, with nine of these participating organisations then emailing a random sample of their external reviewers to participate in a second survey. Organisations reported an

[2] https://rscf.ru/en/news/en-57/no-jumps-to-the-kings-row-rsf-pushes-the-new-ai-based-system-of-finding-reviewers/
[3] https://veluxfoundations.dk/en/technical- and-scientific-research/villum-experiment

increased administrative burden over the previous years. Just under half the reviewers surveyed took part in peer review for the good of research and professional development; only 16% reported that guidance from funders was very clear; 64% expressed a need for training in reviewing grant proposals.

Another commonly reported problem with peer review in grant allocation is the arbitrariness of decisions made. In a retrospective economic analysis of panel members' scores of applications to the National Health and Medical Research Council of Australia in 2009, **Graves et al. (2011)** assessed the effect of variability in scores from panel members. Only 9% of proposals were always funded, 61% never funded and 29% sometimes funded. Researchers spent between 20 and 30 days preparing a grant proposal, with 85% of the total costs of the exercise incurred by applicants, 9% by peer reviewers; and 5% in administration of the scheme. The authors conclude that the process is costly and subject to a high degree of randomness in decision making.

In a recent modeling study, **Brezis & Birukou (2020)** investigate arbitrariness in the peer review process, focussing on two potential causes: homophily (personal taste or preference for certain projects over others); and the constrained time allowed for peer review. Their research suggests that substituting reviewers leads to a stark impact on the way papers are ranked. In addition, their model shows that innovative projects are not highly ranked and often rejected.

Gildenhuys (2020), writing as a philosopher of science, takes a system wide perspective and advocates for a partial lottery approach because it spreads the benefit of science funding across the research system. He concludes that, although counterintuitive to many researchers, lotteries are a fairer way to distribute research funding than peer review.

Guthrie, Ghiga & Wooding (2018) carried out a review of the evidence for the effectiveness and burden of peer review of grant applications in the health sciences. Looking across 105 papers in all, they acknowledged a paucity of evidence for the effectiveness of peer review, but found strong evidence of bias against innovative research, weakness in predicting future research success, and great variation in scores between reviewers. On burden, they found good evidence that the burden of peer review is high, with around 75% of this falling on applicants. The authors conclude by advocating for greater acknowledgement of uncertainty in peer review—for example using the variation in reviewers' scores as a way to identify innovative research. In order to reduce bias and burden and allow better retrospective evaluation of decisions, a partial lottery element is also suggested, as part of a wider commitment to reflexive practice and experimentation in funding methods.

2.4 Predictions, dilemmas and uncertainties

Where focal randomisation does appear to have potential, compared to other methods, is in its ability to protect against the limited capacity of peer reviewers to predict future performance. In his consideration of peer review and lottery methods, **Roumbanis (2019)** explores in detail deficits in the peer review process, and asks what might be lost in the process of converting diverse qualities into numerical scores. He also highlights reviewers' need for consensus which may push them towards more 'solid' applications, when in fact there is no way to tell whether these projects will fare better than others less well written, or using more novel ideas or methods. Rejecting alternatives such as an equal apportioning of funds to every researcher, which he sees as impractical, Roumbanis (2019) suggests a combination of increased block funding to institutions and focal randomisation. He suggests this would save time and increase the variety of projects funded in an impartial manner, whilst also (through increased block funding) devolving to institutions more strategic control over their research direction and longer term goals. **Fang & Casadevall (2016)** concur with the idea that innovative research is more likely to be supported through a modified lottery approach: *"A random strategy that distributes funding as broadly as possible may maximise the likelihood that such discoveries will occur."* (p.4)

Brezis (2007) advocates using focal randomisation in the evaluation of private sector R&D projects. Using a modelling approach, he suggests that using peer review to decide which projects to fund comes unstuck when panels are faced with 'inventions' (completely new technologies) rather than 'innovations' (applications of existing technologies), because it is impossible to assess their impact on the economy. Here, the author argues, focal randomisation is ideally suited to selecting which projects to fund. As well as accounting for cases where reviewers are unable to make a decision due to lack of information, the process would guard against conflicts of interest, where a reviewer is actively biased against a particular application.

Writing in opposition to randomisation methods, **Bedessem (2020)** offers an epistemological criticism of the lottery model. The author considers two arguments for the use of focal randomisation: first, that it is difficult to judge between proposals that are very similar (which he names the 'equally good' argument); and second, that peer review is unable to predict future performance (which he names the 'exploration' argument). He suggests that both positions can be countermanded from an epistemological perspective, in that the system of science is so interconnected that this restricts the generation of ideas that are genuinely of no interest, or not embedded within existing systems of theoretical and methodological practices. Because of these interconnections, it is reasonable to assume that there are not a large number of exploratory projects divorced from existing ideas and systems of practice, and exploring each project's objectives more closely should surface the most beneficial projects. To achieve this outcome, the author suggests a more 'decentralised' approach to funding research. He suggests that current models of peer review are too narrow and an increased pool of reviewers from wider scientific

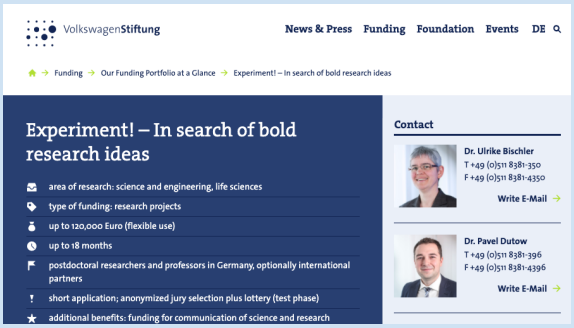
fields should review proposals in order to identify linkages and interconnections between fields. He also reminds us that every allocation method brings with it assumptions about the ways knowledge should be produced and what types of knowledge should be valued.

Finally, **Reinhart & Schendzielorz (2020)** question the legitimacy in allocating funds using random methods, as well as the possible unintended consequences of diluting trust in expert knowledge, which they argue is a central tenet of the entire research system. They also warn that a move to randomisation may supplant one set of biases (those of peer reviewers) with another (those of bureaucrats and administrators).

3. What are RoRI partners doing or planning in this area?

The brief literature review in the previous section highlights recent research and commentary from a variety of fields, on possible uses of modified lottery approaches in the allocation of research funds. Although this body of evidence is growing, published studies based on real-world experiments with such techniques remain rare. This is what makes current or planned efforts by a vanguard of funders to trial these and other experimental approaches so important and interesting. Below we summarise three of these funder experiments which are ongoing (and which will be explored more fully in the RoRI workshop in 1 December 2020.

Volkswagen Foundation's Experiment! Initiative



The Volkswagen Foundation set up its Experiment! funding initiative[4] in 2012. The programme aims to foster unconventional, creative research ideas. These projects may be exploratory and use unconventional methodologies, and applicants are encouraged to 'challenge and transform common wisdom'. Funded projects may report unexpected findings or negative results. The Experiment! Programme funds research in engineering, natural, and life sciences, with awards up to 120,000 Euros.

From 2017 a randomised element was introduced to the selection process. Applicants are required to submit short outline proposals which are assessed for eligibility based on formal criteria by the Foundation staff and anonymised. Eligible applications on the resulting shortlist are then reviewed by a jury panel, some are approved, others are discarded as not meeting the criteria, with the left applications going into a lottery drum. Projects drawn from the lottery are funded. Their number corresponds to the number of projects selected by the jury. Since the introduction of the randomization element, a total of 99 grants have been awarded in this way, with for example, 33 out of 685 applications awarded through the partially randomised process in 2019.

A research project to investigate the effects of the funding initiative and the reliability of the randomised process and to compare it with the use of an expert panel began in 2018. It is

[4] https://www.volkswagenstiftung.de/en/funding/our-funding-portfolio-at-a-glance/experiment/

led by Martina Röbbecke and Dagmar Simon from Evaconsult in cooperation with Joanneum Research (Austria). This is a mixed-methods study, which will include online surveys and interviews with participants who have received funding through the expert panel and the randomisation method. In addition they will interview curators of the Experiment! Programme and representatives of other funding agencies in Germany. The findings of this research will be shared in a workshop in mid-2021 on 'Risky research and randomisation in grant funding'.

Swiss National Science Foundation (SNSF)

The SNSF has completed initial trials of a partially randomised method of funding allocation in their Postdoc Mobility scheme. This scheme allows early career researchers to do a research stay abroad in order to enrich their disciplinary knowledge after completing their doctorate.

The random allocation process for awards comprises three stages. The first stage is a 'triage' based on two referee evaluations, where applications that are clearly not competitive are rejected and those few that are exemplary are funded. The middle group of the applications that are of good quality but not outstanding are discussed in the panels. In the last phase, to avoid bias, a random selection is used for those applications around the funding line that cannot be further differentiated according to the defined evaluation criteria. To have a clear criterion to define this random selection group, the SNSF recommends using a statistical method. This algorithm allows a comparison of each application with every other application and is able to incorporate all sources of uncertainty present in the evaluation process.

Austrian Science Fund (FWF) - 1000 Ideas Programme

In January 2020, The Austrian Science Fund (FWF), launched its 1000 Ideas Programme[5] The aim of the programme is to promote innovative, ingenious ideas to explore potential new fields in scientific research. Applications are accepted from researchers at any stage of their career, and awards range from 50,000 to 150,000 Euros. FWF

[5] https://fwf.ac.at/en/research-funding/fwf-programmes/1000-ideas-programme/

requires research proposals to be anonymous to ameliorate bias in the application process. This removes reference to applicants' identity, career level, institution or partner institutions. Those applications that do not meet this and the specified formatting criteria are rejected without review. The remaining anonymous applications are then ranked, after this an expert panel selects the twelve best applications to be funded. From the remaining applications that are of good quality and worthy of being funded an additional twelve projects are selected at random.
FWF are currently planning the evaluation and analysis of this programme, including the randomisation element.

Several other RoRI partner are considering or scoping potential experiments over the next 12-18 months, including Chan Zuckerberg Initiative (which may trial such approaches in its Essential Open Source Software for Science (EOSS) programme), Novo Nordisk Foundation, Dutch Research Council (NWO) and Michael Smith Foundation for Health Research (MSFHR). .

These experiments, together with the evidence from our selected literature review, point to many opportunities for further testing and trialling of innovative allocation methods. As Avin (2019) suggests in his synthesis of the arguments in support of randomisation: '*While disagreements remain between versions of the argument, and enough uncertainties remain to support different specific implementations, it seems justifiable to run these policies as trial versions to learn more about the outcomes.'*

Our focus in this RoRI workstream is randomisation, as this is the area of greatest current interest among our partners and the wider funding community. However, these approaches form part of a wider suite of potential experiments that are being considered by RoRI partners and other funding agencies and foundations worldwide. We aim to create links across these stakeholders and engage with broader questions in this area in future workshops and events.

4. Summary of RoRI workshop, December 2020

On 1 December 2020, we hosted a half-day workshop for partners and invited experts to scope these issues in greater depth, and learn more about experiments in progress or planned.

4.1 Workshop agenda

Experiments with randomised grant allocation:
a funder workshop to share evidence & approaches
Tuesday, 1st December 2020, 14:00–17:00 GMT

Worldwide, there is growing interest in the application of randomisation, or lottery-style mechanisms within the grant funding system, and a small but growing number of funders are undertaking trials and experiments on various scales. Several of these are members of the RoRI consortium, and through its workstream on randomisation, we aim to support these and other strategic partners over the next 12 months as they plan, design, undertake, or evaluate a further wave of trials of targeted randomisation. Working closely with partners, we hope to facilitate closer alignment and learning from experiments that are underway or planned by different funders, enabling the consortium to build a richer collective picture of the pros, cons and possibilities of these and related approaches.

This kick-off workshop will mark the formal start of this process. Its aim is to provide a structured opportunity for RoRI partners to share their experience of designing and implementing trials of randomisation in grant allocation, to present emerging evidence and findings, and to reflect on broader opportunities for experimentation with funding models. To facilitate open discussion, attendance will be by invitation only to RoRI partners and others active in these debates. An introductory working paper will be circulated to participants ahead of the meeting.

14:00-15:20 Session 1: Funder perspectives, emerging evidence & approaches
Chair and introduction - James Wilsdon, Director, RoRI

Volkswagen Foundation's "Experiment!" Initiative: emerging findings & future plans[6] - Pavel Dutow, Program Manager, Volkswagen Foundation & Dagmar Simon, Managing Director, EvaConsult

Rethinking the funding line: Random selection at the SNSF – Marco Bieri, Scientific Officer & Rachel Heyard, Statistician, Swiss National Science Foundation

[6] For more on the "Experiment!" initiative, see; https://www.volkswagenstiftung.de/en/funding/our-funding-portfolio-at-a-glance/experiment/partially-randomized-procedure

1000 Ideas Programme: a novel mechanism for novel ideas[7] - Tina Olteanu, Scientific Project Officer, Austrian Science Fund (FWF)

Building the strategic case for experimentation in funding methods - Kasper Nørgaard, Senior Scientific Manager, Novo Nordisk Foundation

15:20-15:30 Break

15:30-16:45 Session 2: Learning through experimentation
Chair and introduction: Matthias Egger, President, SNSF

Panel: (*3-4 mins of remarks each, plus discussion).* The panel will identify opportunities for shared learning about the pros and cons of randomisation in grant allocation, and explore broader options for experimental approaches to funder decision making.

Michele Garfinkel, Head, Science Policy Programme, EMBO
Chonnettia Jones, V-P Research, Michael Smith Foundation for Health Research
Danny Goroff, Vice President, Sloan Foundation
Amanda Blatch-Jones, Senior Research Fellow for the Research on Research (RoR) programme, NIHR Evaluations, Trials and Studies Coordinating Centre (NETSCC)
Philip Clarke, Director, Health Economics Research Centre, University of Oxford
Albert Bravo-Biosca, Director, Innovation Growth Lab, Nesta

16:45 Experiments with machine learning – a linked initiative
Jon Holm, Research Council of Norway (RCN)

16:50 Next steps with the project
Helen Buckley Woods, Project Manager, RoRI

16:55 Closing remarks
Matthias Egger, SNSF & James Wilsdon, RoRI

4.2 Speaker slides

- *The "Experiment!" Initiative: emerging findings & future plans—Pavel Dutow, Volkswagen Foundation & Dagmar Simon, EvaConsult*
- *Rethinking the funding line: Random selection at the SNSF – Marco Bieri & Rachel Heyard, Swiss National Science Foundation (SNSF)*
- *1000 Ideas Programme: a novel mechanism for novel ideas—Tina Olteanu, Scientific Project Officer, Austrian Science Fund (FWF)*

[7] For more on the FWF 1000 Ideas programme, see: https://m.fwf.ac.at/en/research-funding/fwf-programmes/1000-ideas-programme/

VolkswagenStiftung

Experiment! – In search of bold research ideas

Pavel Dutow
December 1, 2020

VolkswagenStiftung

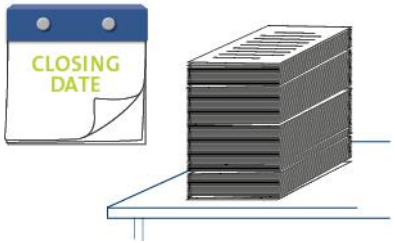
Small Grants Initiative

- Natural, life sciences & engineering
- Up to € 120,000 for 1.5 years
- 30 to 40 grants per year
- For ideas …
  - explorative character; risky, radically transforming common wisdom
  - counterintuitive hypotheses, unconventional methodologies or technologies
  - failure might be included

Non-Standard Selection Process – *"Focal Randomisation"*

Short Proposal (4 pages)

~ 630 Proposals per Call



Selection by Foundation → Shortlist (based on formal criteria)

Selection by Jury Panel

- anonymised
- wild card
- **~ 20 grants**
- rejection of weak proposals
- **grey area → lottery**

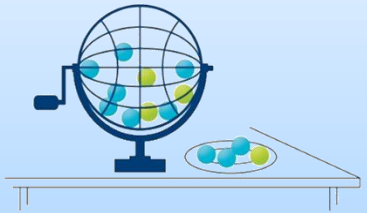
Lottery Element → Ensured Quality

- proposals from the grey area
- **~ 20 grants**

VolkswagenStiftung

Year	Submission	Shortlist	Jury	Lot	Grants
2013	704	93	13	-	13
2014	630	102	19	-	19
2015	426	103	17	-	17
2016	544	102	18	-	18
2017	594	119	17	**12**	29
2018	645	117	23	**14**	37
2019	685	130	19	**14**	33
2020	830	-	-	-	-
Total	**5,058**	**766**	**126**	**40**	**166**

99 projects since 2017
(40 by lottery)



Accompanying Research by EVACONSULT, Berlin

- Lead by EVACONSULT (Dagmar Simon and Martina Röbbecke)
- In cooperation with Joanneum Research in Austria
- Since 2018
- Investigating the effects of Experiment! and the reliability of the randomised process

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EVALUIERUNG FORSCHUNG BERATUNG

„EXPERIMENT!“
RANDOM AND RISK-TAKING RESEARCH

- THE ACCOMPANYING RESEARCH PROJECT –

Workshop: Experiments with randomized grant allocation

Research on Research Institute

Tuesday, 1st December 2020

Martina Röbbecke, Dagmar Simon
EVACONSULT (Berlin)

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EVALUIERUNG FORSCHUNG BERATUNG

QUESTIONS AND METHODS

- Questions:
  - The funding goal of “Experiment!” is to identify groundbreaking research ideas: Can both procedures – the jury decision procedure and lottery procedure – be used?
  - What can be learned from comparing the two procedures?
  - What are the effects of the funding line on the researchers and within the science system?
- Methods:
  - Online survey of all grants 2013-2016 (jury decision)
  - Online surveys of grant round 2017, 2018 and 2019 (partially randomised)
  - Interviews (researchers, representatives of other funding agencies, politicians…)

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CHARACTERISTICS OF THE FUNDED PROJECT (2018)

	not relevant	*hardly relevant*	*neither*	*relevant*	*highly relevant*	*I don't know*
The small number of scientific publications	8 (16%)	3 (6%)	5 (10%)	18 (36%)	14 (28%)	2 (4%)
The challenge of accepted expertise	3 (6%)	4 (8%)	4 (8%)	17 (34%)	19 (38%)	1 (2%)
New theoretical approaches	4 (8%)	3 (6%)	9 (18%)	14 (28%)	19 (38%)	1 (2%)
New methodological approaches	2 (4%)	2 (4%)	3 (6%)	19 (38%)	24 (48%)	0 (0%)
New technologies	9 (18%)	3 (6%)	5 (10%)	20 (40%)	12 (24%)	0 (0%)
First prototype	16 (32%)	5 (10%)	7 (14%)	10 (20%)	11 (22%)	0 (0%)
A proof of principle	3 (6%)	2 (4%)	6 (12%)	17 (34%)	22 (44%)	0 (0%)
A first proof of concept	4 (8%)	4 (8%)	5 (10%)	15 (30%)	22 (44%)	0 (0%)
Uncertainty as to whether execution is possible with existing resources	10 (20%)	7 (14%)	7 (14%)	11 (22%)	15 (30%)	0 (0%)
Hazard potential	34 (68%)	5 (10%)	4 (8%)	2 (4%)	1 (2%)	3 (6%)

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GENERAL CHARACTERISTICS OF LOTTERY SELECTION PROCESSES (2019)

	not true	*rather not true*	*rather true*	*true*	*I don't know*
Individual equal opportunities	1 (4%)	0 (0%)	7 (28%)	16 (64%)	1 (4%)
Encouraging applications with risky research	3 (12%)	0 (0%)	5 (20%)	16 (64%)	1 (4%)
Better chances for risky research	2 (8%)	2 (8%)	7 (28%)	13 (52%)	1 (4%)
Avoidance of conflicts of interest and unconscious bias	0 (0%)	1 (4%)	8 (32%)	14 (56%)	2 (8%)
Opportunities for more thematic and methodical diversity	0 (0%)	5 (20%)	4 (16%)	15 (60%)	1 (4%)
Opportunities for subjects that are weakly represented in the jury	0 (0%)	2 (8%)	6 (24%)	15 (60%)	2 (8%)
Low cost/low effort of application (from the applicant's perspective)	2 (8%)	6 (24%)	6 (24%)	5 (20%)	6 (24%)
Low cost/low effort of application (from the perspective of the funding authority)	1 (4%)	1 (4%)	6 (24%)	7 (28%)	10 (40%)
Lower reputation gain if funding is granted compared to conventional selection procedures	4 (16%)	6 (24%)	7 (28%)	5 (20%)	3 (12%)
Risk of selecting research projects of lower quality	1 (4%)	6 (24%)	9 (36%)	5 (20%)	4 (16%)
Confidentiality of the decision is highly relevant	0 (0%)	7 (28%)	5 (20%)	4 (16%)	9 (36%)

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GENERAL CHARACTERISTICS OF PEER REVIEW PROCESSES (2019)

	not true	*rather not true*	*rather true*	*true*	*I don't know*
Enforcement of professional standards	2 (8%)	2 (8%)	11 (44%)	9 (36%)	1 (4%)
Reputation gain of the author / applicant	2 (8%)	4 (16%)	9 (36%)	7 (28%)	3 (12%)
Legitimation of the research idea in front of colleagues	1 (4%)	3 (12%)	12 (48%)	8 (32%)	1 (4%)
Lack of agreement between experts	0 (0%)	6 (24%)	10 (40%)	3 (12%)	6 (24%)
Insufficient expert quality	2 (8%)	10 (40%)	4 (16%)	2 (8%)	7 (28%)
Expert bias (distortion)	2 (8%)	6 (24%)	9 (36%)	6 (24%)	2 (8%)
Tendency towards more conserative selection (risk-averse experts)	0 (0%)	3 (12%)	11 (44%)	8 (32%)	3 (12%)
High costs or high effort of the application	2 (8%)	9 (36%)	5 (20%)	6 (24%)	3 (12%)
High costs or high effort of the selection procedure	1 (4%)	5 (20%)	8 (32%)	2 (8%)	9 (36%)
Overload of the expert system	0 (0%)	3 (12%)	13 (52%)	7 (28%)	2 (8%)

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WHAT FUNDED SCIENTISTS THINK ABOUT LOTTERY

"… But when you have very specific (.) oh, sorry, subject-specific reviewers that know your subject very well, I can imagine that there is a large degree of bias… And having a mechanism in place that avoids that sort of bias, I think is great and funds the projects that would otherwise not get funded… " *(Postdoc, Natural Science)*

"…And the jury might think, well, but that doesn't work anyway, and yet something like this is encouraged, which could lead to success. Or it could be that it is ahead of its time and the jury is currently busy with other methods or says, yes, now in 2020 this and that method will be the order of the day, why does he want to do something strangely different now? Well, I think that this randomized lottery will also support other projects that are good, but which the jury might consider to be" *(Postdoc, Life Sciences)*

"It gives ideas a chance that otherwise have no chance at all, ne? Of course, these can be those that for good reason have no chance at all, but they can also be those that for no good reason have no chance, even unfoundedly or for the wrong reasons. In this respect, it increases the chance of doing something completely unusual, so I find it an exciting approach". *(Professor, Engineering Sciences)*

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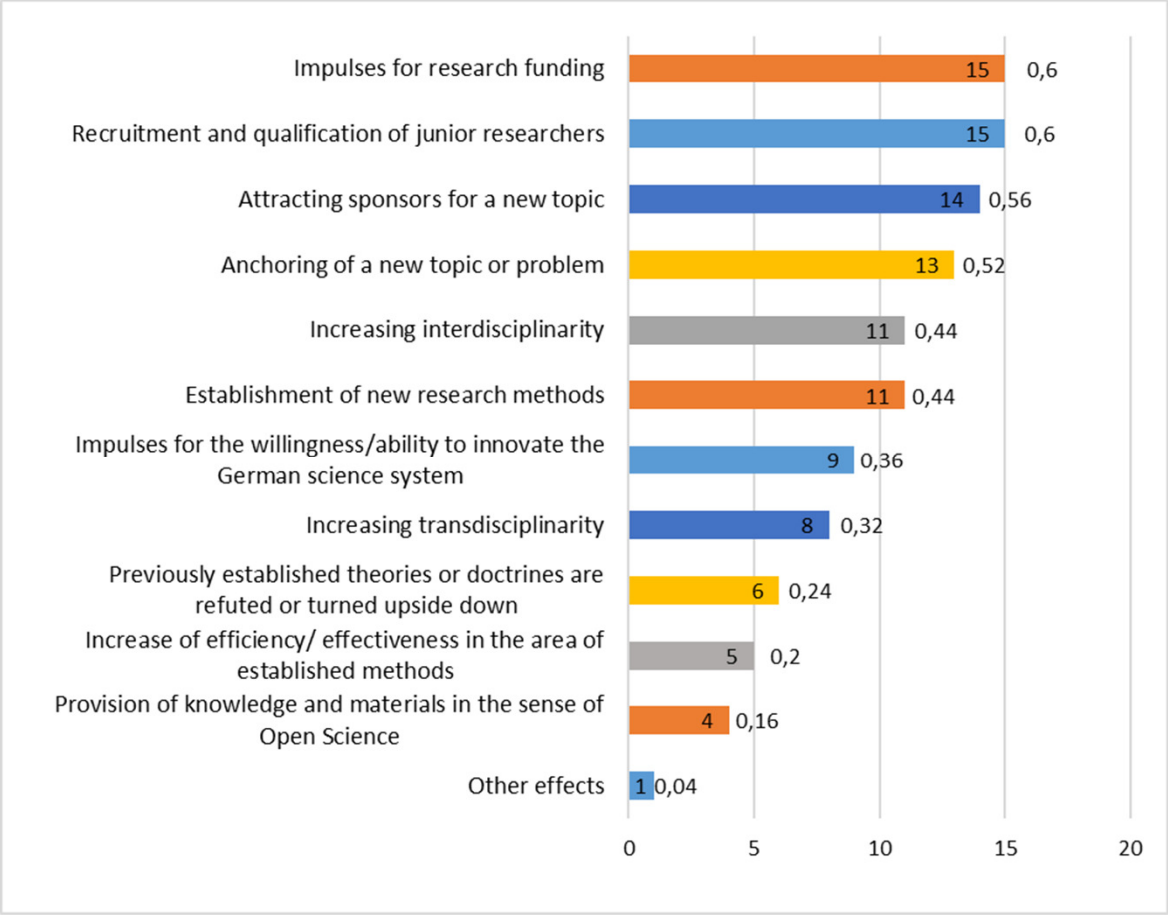
EFFECTS ON THE SCIENCE SYSTEM (2019)



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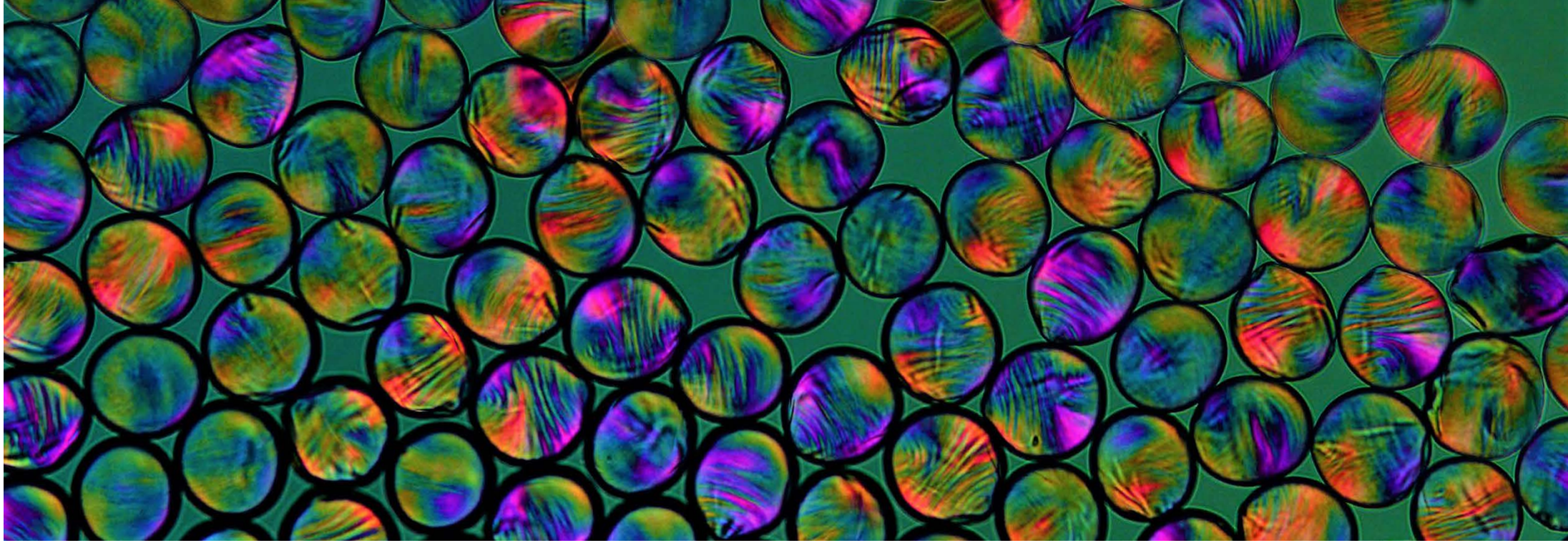
CONCLUSIONS AND FURTHER STEPS

- Risky research: area of science matters
- Scientific via „social“ risk?
- Acceptance of selection process via lottery
- In the long run: Differences between selection by peer review and by lottery
- Strong interest in the programme initiative „Experiment“ (science system, international research foundations, media…)
- Next steps: Consolidation of first result by interviews



Rethinking the funding line: Random selection at the SNSF

Bieri Marco and Heyard Rachel, 01.12.2020

FNSNF
Schweizerischer Nationalfonds
zur Förderung der wissenschaftlichen Forschung

Postdoc.Mobility pilot study

Limitations of grant peer review

F1000Research F1000Research 2018, 6:1335 Last updated: 17 MAY 2019

Check for updates

REVIEW

REVISED **What do we know about grant peer review in the health sciences? [version 2; peer review: 2 approved]**

Susan Guthrie [1], Ioana Ghiga[1], Steven Wooding [2]

[1]RAND Europe, Westbrook Centre, Milton Road, Cambridge, UK
[2]Centre for Science and Policy, University of Cambridge, Cambridge, UK

‘Funders could consider a lottery element in some parts of their funding allocation process, to reduce both burden and bias, and allow better evaluation of decision processes’

General critique	Particular criticism(s)	Is the criticism valid?
Peer review does not fund the best science	It is anti-innovation	Yes
	It does not reward interdisciplinary work	Unclear
	It does not reward translational/ applied research	Unclear
	It is only a weak predictor of future performance	Yes
Peer review is unreliable	Ratings vary considerably between reviewers	Yes
	It struggles to achieve an acceptable level of consistency	Unclear
Peer review is unfair	It is gender-biased	Unclear
	It is age-biased	Unclear
	It is biased by cognitive particularism	Unclear
	It is open to cronyism	Yes
Peer review is not accountable	Review anonymity reduces transparency	N/A
Peer review is not timely	It slows down the grant award process detrimentally	Unclear
Peer review does not have the confidence of key stakeholders	It is not the preferred method of resource allocation	No

Potential advantages of a modified lottery approach

- Acknowledge the limitations of peer review
- Increase efficiency
- Reduce bias
- “The system is already in essence a lottery without the benefit of being random”

Postdoc.Mobility junior fellowship scheme

Aim

Research stay abroad for postdocs starting their career (24 months in principle, but at least 12 months) with a return option to Switzerland (3 – 12 months)

More info

http://www.snf.ch/en/funding/careers/postdoc-mobility/Pages/default.aspx

Background and aim of the pilot

Background

- As of 2021, about 3x more Postdoc.Mobility applications

Test a new procedure that

- is of high quality
- is fair and transparent and complies with the DORA* declaration
- is efficient and economical
- considers the latest knowledge of “research on research”

*https://sfdora.org/

Elements of the pilot

Triage

- After pre-screening, only applications in the “middle group” are discussed in the panel meetings → save resources and increase efficiency

Drawing lots to break ties

- Random selection for a small share of applications of similar quality close to the funding threshold → avoid bias and arbitrariness

Comparative study

- Learn how a remote evaluation agrees with panel meetings

Lessons learned

Triage

- Procedure turned out to be very efficient, only about half of the evaluated applications were discussed in the panel meetings
- Procedure accepted by the panel members

Drawing lots to break ties

- Random selection group is rather small (<10% of evaluated applications)
- There was some reservation among some panel members, but acceptance grew over time
- Applicants have not raised any objection up to now

Comparative study (https://www.biorxiv.org/content/10.1101/2020.11.26.400028v1)

- High agreement (>80%) between remote evaluation and evaluation with panel meetings in terms of funding/rejection decisions

The expected rank to rethink the funding line

Expected Rank

Ranking applications based on the average of the individual reviewer votes might be misleading

→ ignores all sources of uncertainty

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If funding line goes through a (large) tie

→ long discussions increase costs and risk of implicit bias

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Ranking applications based on the average of the individual reviewer votes might be misleading

→ ignores all sources of uncertainty

If funding line goes through a (large) tie

→ long discussions increase costs and risk of implicit bias

Solution:

- Statistical Model to account for diverse sources of uncertainty
- Incorporate variances / uncertainty in the computation of a final rank: the expected rank (ER)
- Funding Line should not be a strict line anymore: allow for random elements

Expected Rank : requirement and advantages

Requirements:

Individual votes, and unique identifiers for voters and applications

Expected Rank : requirement and advantages

Requirements:

Individual votes, and unique identifiers for voters and applications

Advantages:

- Every application is compared with every other application in the same call → comparative ranking
- We are actually using all the information that we have
- Avoid additional costs and biases

Expected Rank : Example

# Project discussed	# Panel members	# Fundable Projects
24	28	6

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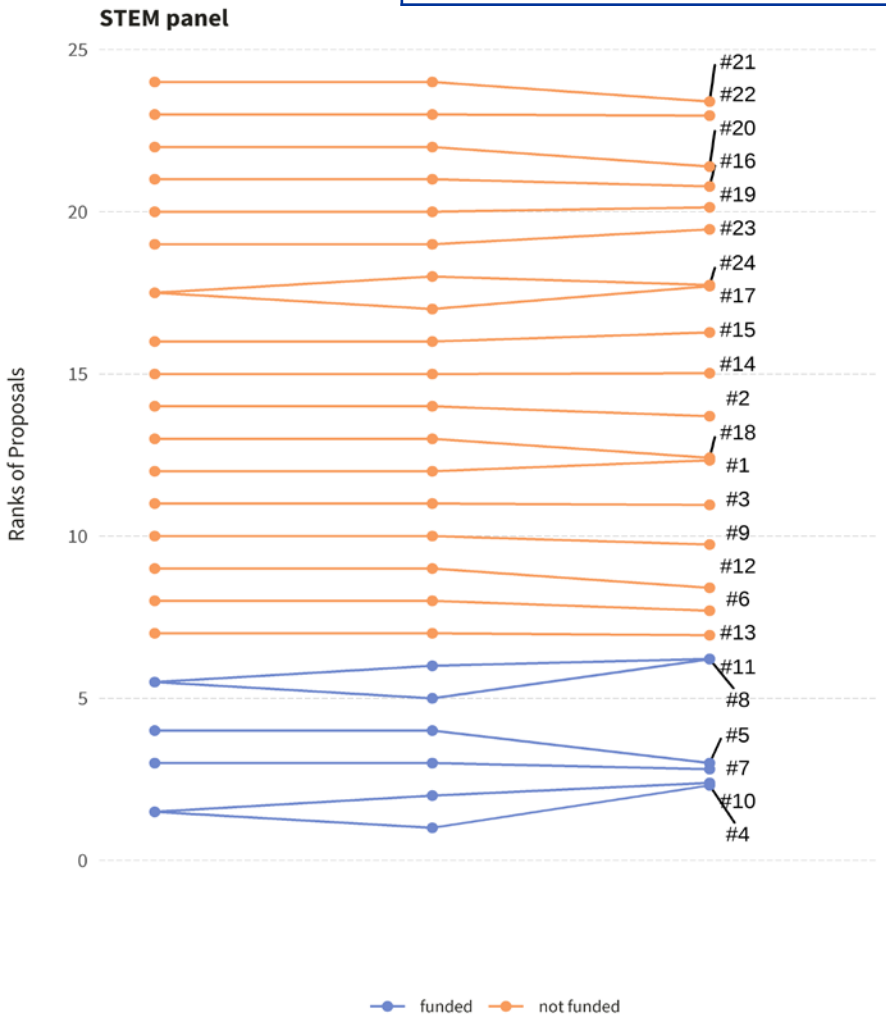
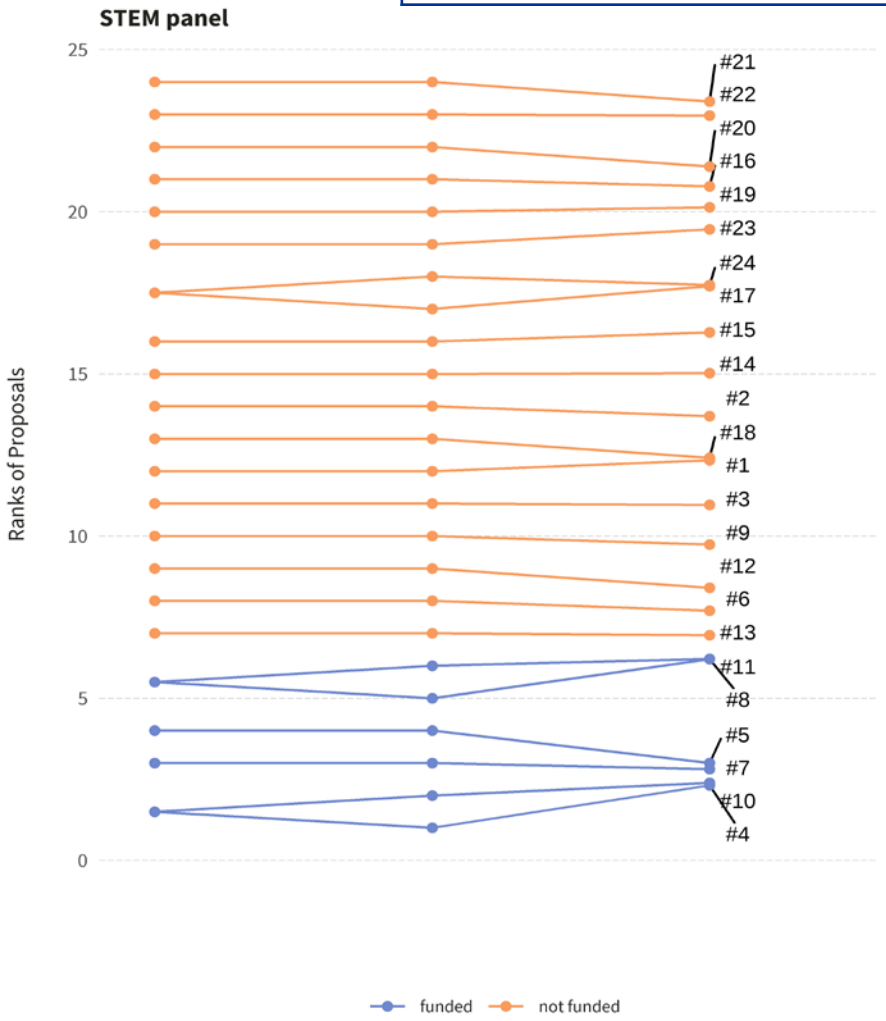
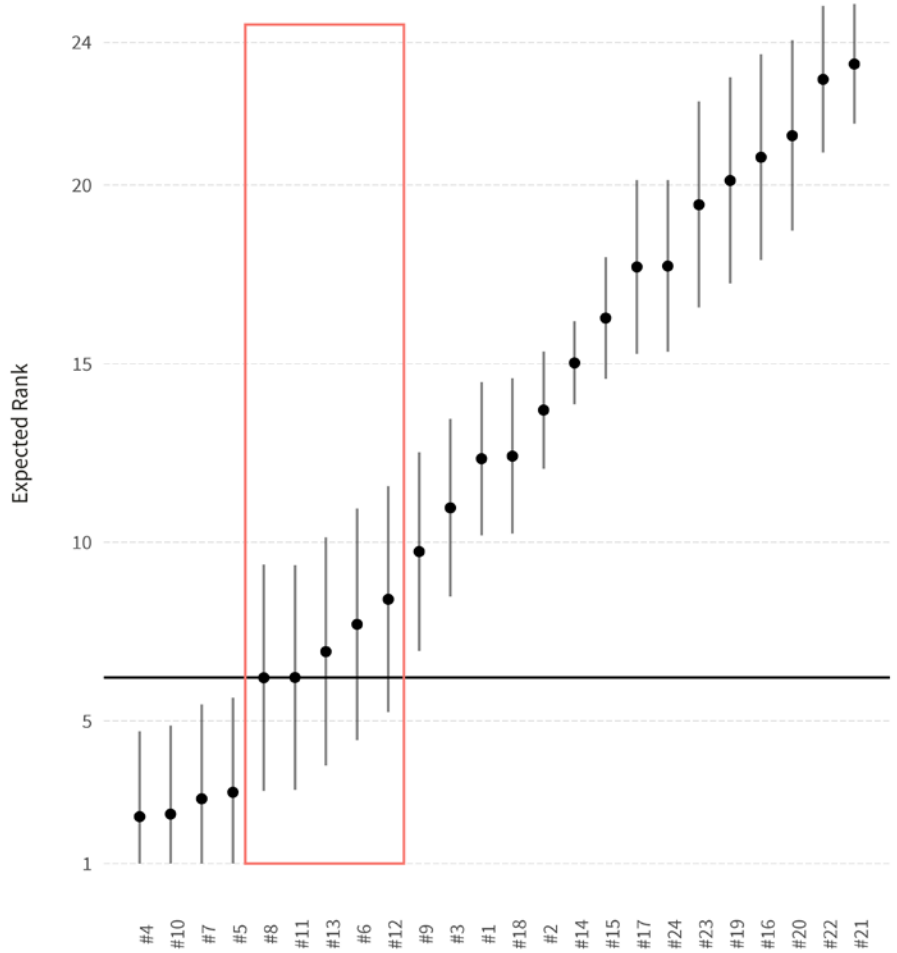
# Project discussed	# Panel members	# Fundable Projects
24	28	6



Expected Rank : Example

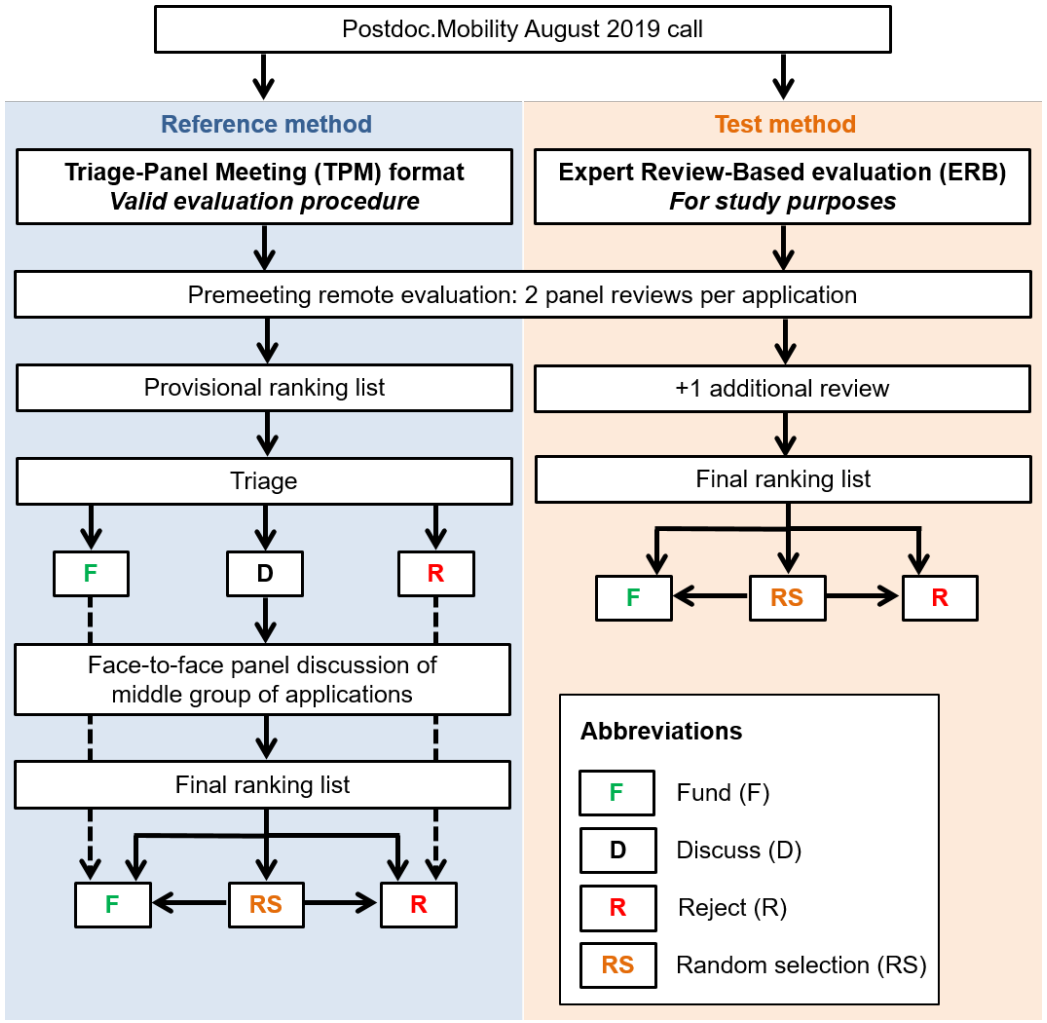
# Project discussed	# Panel members	# Fundable Projects
24	28	6





Thank you. Questions?

Comparative study: Design



Triage evaluation vs Remote evaluation

- Gain practical experience with both procedures
- Assess the agreement between the two procedures in terms of the funding decision
- Assess the group size of applications for a random selection for both procedures

Why does it matter? Peer review systems are costly in terms of time and effort – for funders, peer reviewers, and in particular for the applicants

The funding line dilemma

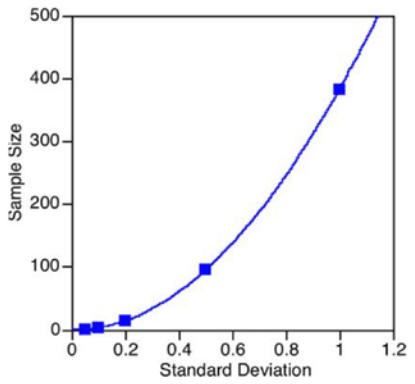


Figure 2. The relationship between the standard deviation of the scores and the minimum required number of evaluators needed for a precision of 0.1, which is the level of precision currently obtained in the NIH peer review system.
doi:10.1371/journal.pone.0002761.g002

1	3.5	Female
2	3.45	Male
3	3.36	Male
4	3.24	Ethnic minority
5	3.13	Young researcher
6	3.05	Clinician
7	3.05	Male
8	2.92	Male
9	2.91	Female
10	2.91	Clinician
11	2.90	Young researcher
12	2.52	Male
13	2.40	Male
14	2.24	Male
15	2.10	Female
16	2.05	Clinician

FWF
Der Wissenschaftsfonds.

1000 Ideas Programme

Dr. Tina Olteanu
Programme Manager, Department for National Programmes
RoRI Workshop, December 1, 2020

Agenda

Der Wissenschaftsfonds.

- Why randomization?
- Description of the programme
- Decision making process/funding decisions
- Perception and Feedback

Motivation for a Randomised Element in the Selection Process

Der Wissenschaftsfonds.

Insights from the regular FWF decision-making process

- Very good, fundable projects that are not excellent are discussed in an interdisciplinary setting, limited budget
- At a certain point, **differentiation** of the projects on the basis of the scientific quality is very hard and potentially biased
  - Potential **biases**: Personal communication skills, persuasion, disciplinary perspective, time, need for a coffee break etc.
- Randomization comes in at a **very late stage** of the decision-making process, when “arguments” become less convincing

→ …randomization might be more fair!
(so let’s give it a try)

1,000 Ideas Programme

Der Wissenschaftsfonds.

Objectives

- Promotion of **radically new** and **risky** as well as particularly original research ideas that are **beyond the current scientific understanding**.
  - Potentially: Courage to fail
- Seed funding for research ideas not yet supported by existing programmes.
- The exploratory phase is expected to provide initial evidence of the feasibility of the idea and the underlying research hypothesis.

Requirement

- Research ideas/hypothesis should have a high potential to transform a field of research and/or to fundamentally question established paradigms.

Funding

- € 50,000 to € 150,000
- Duration: 6 to 24 months

Selection for funding: two stages
1. Call (2019/2020)

Der Wissenschaftsfonds.

Double-blind review process

Preparation: Proposal assessment by external reviewers

- Select the fundable projects from all applications
  - From 401 application, 306 went in the evaluation process
  - 122 reached the threshold for the jury

Selection Part 1: Jury (ranking incl. wildcard)

- Selection of the (max.) 12 best applications (from 43 projects that were discussed)
- Each member has a wildcard to enforce one selected application against the opinion of the jury.
  - Total number remains max. 12 projects

Selection Part 2: FWF Board (random draw from pre-selected pool)

- From the remaining pool, another (max.) 12 applications are drawn randomly.
  - Pool size: 21 projects

Procedure at the Board Meeting (virtual due to Covid-19)

Der Wissenschaftsfonds.

Process Design to ensure trustworthiness

- Randomization Code (Software: R) was presented and discussed
- The FWF board was asked to agree to this selection procedure
  - Plan B with paper sheets was set up, just in case
- Presentation of the 12 projects proposed for funding by the jury: applicants were revealed after funding was approved
- List of projects for the lottery was presented
  - Only project ID and title
- Possibility for a screenshot was given
- List was saved to an excel file (process was visible on screen)
- Randomized selection via R took place
  - Positive list and negative list (again ID and title were presented)
  - Positive list was approved and names of the applicants were made visible
- Applicants are **not** informed whether their project was selected by a jury decision or by the lottery

Feedback / Opinions

- The most critical notion we have heard from the FWF board:

  "I am still against randomization but if we want to do it, then this procedure is really excellent"

- No complaints from applicants, some successful PI asked out of curiosity whether they were drawn in the lottery or directedly awarded by the jury

- Criticism from the FWF board and the jury was rather on the objectives of the programme itself and on the quality of the applications (too conservative, too "safe")

FWF

Der Wissenschaftsfonds.

NEUES ENTDECKEN
TALENTE FÖRDERN
IDEEN UMSETZEN

WIR. FÖRDERN. ZUKUNFT.

5. Next steps and opportunities for engagement

Following further discussions with RoRI partners, and scoping work by the project steering group (chaired by Michele Garfinkel of EMBO), we have firmed up plans for this strand of work to the end of 2021, through various opportunities for partners to engage and contribute. These include:

5.1 Bespoke support for partners in designing or evaluating trials

In recent months, we have supported a handful of RoRI partners with aspects of the design or evaluation of trials or experiments with grant allocation, or in building the internal strategic case for such activities. One recent example was a workshop in late May with senior managers at the Research Council of Norway, which provided some international context to their own plans in this area. A further round of partner experiments is also being scoped out as part of a potential RoRI phase 2, from 2022 onwards.

5.2 The Experimental Research Funders' Handbook.

This will be a practical guide to support funders in planning, implementing and evaluating experiments with grant allocation (including but not limited to randomisation). It will include practical guidance and case studies, designed to support funders as they embark on more widespread testing, trialling and evaluation of novel modes of funding allocation. The Handbook will be launched in December 2021, at a workshop co-hosted by the Swiss National Science Foundation and RoRI. A team from EMBO and Nesta's Innovation Growth Lab are working with RoRI to compile the handbook.

5.3 Motivations, drivers and constraints in the adoption of partial randomisation in research funding: a multi-funder study.

This small-scale empirical study will comprise in depth interviews and a survey. Working with several of the RoRI partners, its purpose is to better understand the range of funder motivations for the use of partial randomisation in grant allocation, and to capture the views of a small cross-section of senior managers within those funders, and members of funding panels, towards this and other experimental approaches to allocation.

To explore this strand of work further, or to share any relevant material, please contact Helen Buckley Woods (h.b.woods@sheffield.ac.uk).

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