

FUNDING THE FUTURE?

FUNDING THE FUTURE? ETHICAL CONSIDERATIONS FOR THE USE OF
RESEARCH-FOCUSED CROWDFUNDING PLATFORMS

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Lay Abstract

Crowdfunding is an online fundraising tool that allows organizations to collect funds from a broad range of individuals. While many crowdfunding platforms support a panoply of projects, there are others that cater specifically to researchers. Due to the novelty of crowdfunding as a financial resource for researchers, a number of important, complex issues surrounding its use have yet to be addressed and a number of ethical questions have yet to be answered. This project marks one of the first efforts to evaluate the ethical concerns associated with the use of crowdfunding platforms to support the production of research. I highlight ethical issues that pertain to governance, trust and accountability, and transparency, along with a number of other pressing issues related to social inequalities. Crowdfunding has the potential to revolutionize how research is produced and funded, but it cannot be allowed to persist as an online space with so few rules.

Abstract

Crowdfunding is an online fundraising tool that allows individuals or groups to collect donations from individuals both in and beyond their immediate networks, usually facilitated by social media. While many crowdfunding platforms support a panoply of projects, there are others that cater specifically to researchers. In this thesis, I evaluate a number of ethical and social issues related to the growth in popularity of these platforms. I discuss the issues of governance, accountability and trust, and transparency. I argue that currently, these platforms cannot be said to operate in a manner that indicates strong governance, and add that crowdfunding lacks the built-in accountability mechanisms of more traditional funding avenues such as grant-based funding. As a result, crowdfunding requires the building of trust between researchers, donors, and the platforms themselves. I conclude this section by arguing that better transparency may provide a way for crowdfunding to become a more trustworthy style of funding.

I also critique the claims that crowdfunding can resolve a number of social inequalities related to income, experience, and global development. I dedicate a chapter to this critique and argue that despite claims that crowdfunding is currently democratizing research, there are still a number of issues that demonstrate that crowdfunding is not currently the “great equalizer” many claim it to be.

This project marks one of the first long-form efforts to critically evaluate the conduct of crowdfunding platforms that specialize in funding for research, and I present and defend the view that while potentially beneficial for individuals and institutions, crowdfunding for research cannot continue to exist as a “Wild West”.

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Abbreviations and acronyms

Canadian Institutes of Health Research (CIHR)

Early-career researcher (ECR)

High-income country/countries (HIC/HICs)

Innovation, Science and Economic Development Canada (ISED)

Institute on Governance (IoG)

Low and middle-income country/countries (LMIC/LMICs)

Natural Sciences and Engineering Research Council (NSERC)

National Science Foundation (NSF)

Principal Investigator (PI)

Social Sciences and Humanities Research Council (SSHRC)

Tri-Council (CIHR, NSERC, SSHRC)

Declaration of academic achievement

I, Rachel Katz, declare this thesis to be my own work. I am the sole author of this document. No part of this work has been published or submitted for publication or for a higher degree at another institution.

To the best of my knowledge, the content of this document does not infringe on anyone's copyright.

My supervisor, Dr. Claudia Emerson, and second reader, Dr. Ariella Binik, have provided guidance and support at all stages of this project. I completed all of the research work.

Introduction

Professor Doe runs a lab at the University of Hypotheticals. She is one of the youngest Principal Investigators (PIs) at the U of H, and while her lab conducts innovative experiments and regularly publishes intriguing papers in journals, Prof. Doe is not yet an “established” PI in her field. She has just received word from the National Science and Engineering Research Council that her grant proposal has not been selected for the current funding cycle. Instead of abandoning her proposal, Prof. Doe turns to her computer, creates an account on crowdfunding platform Experiment.com, and submits her grant proposal to the site for approval.¹ Within two weeks, her project has been approved and she is able to begin collecting donations from friends, colleagues, and helpful strangers on the Internet.

Why would Prof. Doe turn to such a platform? What are the merits and shortcomings of using a crowdfunding platform for the purpose of funding research? How are projects reviewed and approved? What ethical ramifications may arise from this style of funding? Due to the novelty of crowdfunding as a financial resource for researchers, a number of important, complex issues surrounding its use have yet to be addressed and a number of ethical questions have yet to be answered. Existing literature discusses the mechanics of the use crowdfunding to a degree, though much of it consists of advice for researchers who wish to crowdfund a research project. Almost none of these papers discuss any of the range of ethical issues related to both this style of funding and this

¹ In this project, I use Experiment.com (typically referred to as “Experiment”) as my case study platform. While others exist, Experiment has become the most successful and most well-utilized of these platforms.

manner of conducting research, nor do they acknowledge or address the socioeconomic inequalities perpetuated by crowdfunding research platforms.

In this thesis, I will first define and explain crowdfunding, its use in academic research, who uses it and why they do so, and practical benefits and drawbacks of its use. Following this, I devote my second chapter to an exploration of three types of ethical issues: those related to governance, accountability and trust, and transparency. These are not the only ethical questions one can raise about the use of crowdfunding for research, but together these three issues provide a fairly comprehensive picture of the relevant issues. In my third chapter, I describe some of the socioeconomic and equity issues relevant to the use of crowdfunding. These issues are the possible consequences of the current shortcomings of the lack of appropriate governance in the world of crowdfunding for research projects.

With this thesis, I aim to provide the first in-depth analysis of ethical and equity issues surrounding the use of crowdfunding for research initiatives. While the majority of the extant literature on crowdfunding for research has drawn attention to its use and utility and the demographics of its user base, this project marks an initial attempt to identify and explain where gaps in the crowdfunding model leave space for significant ethical concerns. I do not take my project to be a dismissal of the use of crowdfunding for research initiatives, nor do I wish for my critique to be taken as a warning or admonishment for the use of this style of funding in research. I am keenly interested in

the claims that crowdfunding is a funding avenue with great potential,² but I am also critical of the fact that these claims do not consider the ethical quandaries that exist just beyond the patina of crowdfunding as “an attractive new option” for researchers.³ I will argue that this funding model should not continue to exist and operate in the manner in which it currently does, as I believe it does not allow for researchers to demonstrate trustworthiness, its efforts at transparent conduct are insufficient, and it is not currently the alleviator of marginalization it is often purported to be.⁴ Ultimately though, I do hope to convey an excitement for the use of crowdfunding for research projects. The issues I will detail in the following chapters can be resolved with changes to policy and approach and demonstrate how crowdfunding can become a superior funding model for research in the 21st century.

² Julien Vachelard et al., “A Guide to Scientific Crowdfunding,” *PLOS Biology* 14, no. 2 (February 17, 2016): 6, <https://doi.org/10.1371/journal.pbio.1002373>.

³ Vachelard et al., 1.

⁴ Vachelard et al., 1.

Chapter 1: The mechanics of crowdfunding for research

1.1 Introduction: A note on “research”

Before any discussion of crowdfunding, especially crowdfunding for research, it is first important to understand what I mean by crowdfunding and research.

Crowdfunding is an online tool for facilitating fundraising from a wide range of individuals.⁵ These platforms allow for individuals to solicit donations from others both in and beyond their direct networks. While many sites are dedicated to entrepreneurial crowdfunding, others have emerged that specifically cater to researchers and their fundraising needs.⁶ The most prominent of these platforms is Experiment, which exists to expand the number and range of people who can be involved in research.⁷

Since its initial use in the 15th century, the term “research” has been used to label an expanding range of types of inquiry. A journalist infiltrating an underground political movement’s online forum? Research. A telemarketer asking you to complete a survey during what is inevitably the busiest part of your day? Research. A philosophy student comparing different translations of Plato to glean some new meaning from an ancient piece of writing? Research. A professor studying the evolution of a particular fish in the Hamilton Harbour? Research. My project is not to discredit any of these uses of the term, but I want to clarify my use of the term in this thesis, which is more closely aligned with the third and fourth examples than the first two mentioned above. Traditionally speaking,

⁵ Rachel E. Wheat et al., “Raising Money for Scientific Research through Crowdfunding,” *Trends in Ecology & Evolution* 28, no. 2 (February 1, 2013): 71, <https://doi.org/10.1016/j.tree.2012.11.001>.

⁶ Wheat et al., 71.

⁷ “About Us,” Experiment - Moving Science Forward, accessed February 3, 2020, <https://experiment.com/about>.

modern academic “research” refers to a project or other undertaking designed to extend human knowledge, typically through inquiry, observation, or other investigation.⁸ I think this definition holds true for new ways of doing research, including crowdfunding. But while the advent of crowdfunding as an alternative for traditional grant-based funding is an interesting development, it is one that goes hand in hand with a changing understanding of who can do it.

Prior to the Renaissance of the 14th-16th centuries, inquiry about the natural world was carried out in secret.⁹ The Scientific Revolution brought about changes to the way this inquiry was carried out, and led Francis Bacon to the view laid out in his *Nova Atlantis*, where a fictional society founded an organization called Salomon’s House, dedicated to the study of the natural world.¹⁰ Bacon’s fantasy gave rise to the Royal Society of London, an organization dedicated to the discerning of facts through experiment.¹¹ The Royal Society of London launched what is still the longest running peer-reviewed journal, *Philosophical Transactions*, and over time the Society was able to acquire funding opportunities for its members.¹² As the centuries passed, other Royal Societies were formed, along with other more niche organizations dedicated to specific

⁸ Interagency Advisory Panel on Research Ethics Government of Canada, “Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – TCPS 2 (2018) – Chapter 1: Ethics Framework,” April 1, 2019, 7, https://ethics.gc.ca/eng/tcps2-eptc2_2018_chapter1-chapitre1.html.

⁹ P. A. David, “Understanding the Emergence of ‘open Science’ Institutions: Functionalist Economics in Historical Context,” *Industrial and Corporate Change* 13, no. 4 (August 1, 2004): 574, <https://doi.org/10.1093/icc/dth023>.

¹⁰ Francis Bacon, *Bacon’s Advancement of Learning and The New Atlantis* (Oxford University Press, 1906), 255.

¹¹ “History of the Royal Society | Royal Society,” accessed June 28, 2020, <https://royalsociety.org/about-us/history/>.

¹² “History of the Royal Society | Royal Society.”

fields of study.^{13,14} As these groups became more established, they grew and collaborated with one another and eventually organized around norms that governed their conduct and approach to doing research. The most well-known of these are Robert Merton’s norms; pillars intended to describe the “modern ethos of science” and guide researchers.¹⁵ I describe these in more detail in the second chapter, but taken together these norms were intended to create a fair, honest research landscape that promoted collaboration rather than the development of ego.¹⁶

When the Royal Society of London and its early sibling societies were formed, research institutes served mainly as a way to unite groups of scholars interested in the same areas of study.¹⁷ Some groups, such as the Royal Society of London, became renowned for their quality as organizations comprised of notable Fellows, a phenomenon still seen today with more modern research centres and institutes. The Royal Society of London still mentions the accomplishments of its early Fellows on its website (e.g. Robert Hooke, Sir Isaac Newton), touting their accomplishments and demonstrating the merit of their organization.¹⁸ Becoming a Fellow of the Royal Society is a great achievement, one researchers still jump to be part of largely because of the implications

¹³ Steven Shapin, “Property, Patronage, and the Politics of Science: The Founding of the Royal Society of Edinburgh,” *The British Journal for the History of Science* 7, no. 1 (March 1974): 1–41, <https://doi.org/10.1017/S000708740001284X>.

¹⁴ Joan Mason, “Hertha Ayrton (1854-1923) and the Admission of Women to the Royal Society of London,” *Notes and Records of the Royal Society of London* 45, no. 2 (July 1, 1991): 210, <https://doi.org/10.1098/rsnr.1991.0019>.

¹⁵ Robert K. Merton, “A Note on Science and Democracy,” *Journal of Legal and Political Sociology* 1, no. 1 and 2 (1942): 118.

¹⁶ Merton, “A Note on Science and Democracy.”

¹⁷ R. H. Syfret, “The Origins of the Royal Society,” *Notes and Records of the Royal Society of London* 5, no. 2 (April 1, 1948): 76, <https://doi.org/10.1098/rsnr.1948.0017>.

¹⁸ “History of the Royal Society | Royal Society.”

of who becomes an equal when they are awarded the coveted “FRS” designation.¹⁹ While a discussion of institutional prestige requires more space than I am able to allot here, it is important to flag prestige — or the perceived strength of an institution’s reputation as an important factor in determining success in today’s academic and research landscapes. Studies have shown that a university’s prestige can affect the career outcomes of its doctoral graduates, an observation many of us could likely intuit.²⁰ I provide all this background as context for the circumstances that have given rise to both novel funding systems and calls for change within academic research.²¹ Currently, young researchers and those from less affluent backgrounds are likely to encounter failure when applying for traditional grants.²² Funding from government grants is scarce, and funders are unlikely to want to invest in “riskier” projects or researchers who have yet to prove themselves in their respective field.²³ This is where crowdfunding is touted to make a difference for academic researchers. Researchers who find success on crowdfunding sites may be regarded as “higher risk” in a traditional grant application pool either as a result of the uniqueness of their project proposal or their status as a student or early-career

¹⁹ Minjung Sung and Sung-Un Yang, “Toward the Model of University Image: The Influence of Brand Personality, External Prestige, and Reputation,” *Journal of Public Relations Research* 20, no. 4 (September 12, 2008): 362, <https://doi.org/10.1080/10627260802153207>.

²⁰ Lutz Bornmann and Hans-Dieter Daniel, “Potential Sources of Bias in Research Fellowship Assessments: Effects of University Prestige and Field of Study,” *Research Evaluation* 15, no. 3 (December 1, 2006): 216, <https://doi.org/10.3152/147154406781775850>.

²¹ Wheat et al., “Raising Money for Scientific Research through Crowdfunding,” 71.

²² Vachelard et al., “A Guide to Scientific Crowdfunding,” 1.

²³ Wheat et al., “Raising Money for Scientific Research through Crowdfunding,” 71.

researcher.^{24,25} Other times, researchers are hoping to raise a small amount of money for an early-stage experiment that may serve as proof of concept for later grant applications.²⁶ Experiment, the largest crowdfunding site for researchers, has funded over 900 projects since their launch in 2012 and in doing so has granted financial support to hundreds of researchers who would have likely not received financial support for their work through more traditional streams.²⁷

There is a final distinction and a final clarification I wish to convey. The first is the difference between crowdfunded research and citizen science/research. While the former refers to projects that receive at least some of their funding from a large number of donors making small contributions, citizen science/research involves members of the public (i.e. non-researchers) as collaborators in the research process, either through data collection, analysis, or other methods of scientific discovery.²⁸ While crowdfunding platforms allow for non-academic researchers to launch projects, I am limiting the majority of my discussion (save for a section in my third chapter) to academic researchers. While “researcher” is a potentially broadening term, my project is not specifically to interrogate this change. I also wish to clarify the kind of research I will be

²⁴ Mary Brophy Marcus, “Crowdfunding: Experiment.Com Helps Scientists Raise Money for Difficult-to-Fund Research,” *Oncology Times* 37, no. 5 (March 10, 2015): 29–30, <https://doi.org/10.1097/01.COT.0000462461.25087.88>.

²⁵ Julie S. Hui and Elizabeth M. Gerber, “Crowdfunding Science: Sharing Research with an Extended Audience,” in *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing, CSCW ’15* (New York, NY, USA: ACM, 2015), 37, <https://doi.org/10.1145/2675133.2675188>.

²⁶ Nancy Averett, “With Funding Tight, Researchers Tap the Public,” *BioScience* 63, no. 11 (November 2013): 908, <https://doi.org/doi:10.1525/bio.2013.63.11.14>.

²⁷ “Frequently Asked Questions,” accessed February 5, 2020, <https://experiment.com/faq>.

²⁸ Sharona Hoffman, “Citizen Science: The Law and Ethics of Public Access to Medical Big Data,” *Berkeley Technology Law Journal* 30, no. 3 (2015): 1745.

discussing in the subsequent chapters. While combing the library to complete a project in philosophy is just as much research as an experiment in a laboratory, the majority of the projects listed on crowdfunding platforms pertain to science or social science fields that require the collection of data, whether that be through interviews, experimental data, or telescopic observations. I will use the terms science and research with discretion, but I would like the reader to note that much of the literature uses the former term exclusively.

1.2 Crowdfund what?

Publicly-funded research in Canada is divided into four broad categories: health, social science and humanities, natural science and engineering, and innovation in science and economic development.²⁹ These categories are governed by four bodies: the Canadian Institutes of Health Research (CIHR), the Social Sciences and Humanities Research Council of Canada (SSHRC), the Natural Sciences and Engineering Research Council of Canada (NSERC), and Innovation, Science and Economic Development Canada (ISED).³⁰ Together, CIHR, SSHRC, and NSERC comprise the “Tri-Council” which has its own code of conduct, ethics guidelines, and individual and intra-council funding competitions. In the United States, funding for most fields in science (including social sciences) and engineering can be sought from the National Science Foundation (NSF).³¹ Regardless of the field or institution, the grant-writing process is competitive, and only a fraction of grant applications can be funded. For example, the NSF reports that of the

²⁹ Science and Economic Development Canada Innovation, “Research Funding and Awards,” May 11, 2015, <https://www.canada.ca/en/services/science/researchfunding.html>.

³⁰ Innovation.

³¹ “US NSF - About Funding,” accessed February 3, 2020, <https://www.nsf.gov/funding/aboutfunding.jsp>.

40,000 proposals they receive for research and educational projects in a given year, 11,000 are funded.³² This means that over 70 percent of research initiatives are rejected. Additionally, bodies such as the NSF receive thousands of applications for graduate and postdoctoral fellowships, further highlighting the competitiveness of the grant application cycle.³³

How can the academic researchers not selected for grants proceed with their projects? Crowdfunding has emerged as an alternate avenue for researchers who seek financial support for their research projects. Through crowdfunding, researchers can promote their project and ask for contributions directly from members of the public.³⁴ Hui and Gerber argue that crowdfunding is a beneficial way to finance research for two reasons: it allows researchers to connect with the public over their current work and in turn, the public is given a direct voice with which they can affect future research initiatives.³⁵

1.3 Facts and Mechanics

There are a number of sites researchers can use to create pages for their projects. These range from more general sites including Kickstarter and Indiegogo to Experiment, a platform created specifically for researchers to use to promote their proposals. Other sites, such as #SciFund Challenge and Petridish are mentioned in the literature,³⁶ but larger platforms have bought some of these smaller sites. In this project, I will focus on

³² “US NSF - About Funding.”

³³ “US NSF - About Funding.”

³⁴ Wheat et al., “Raising Money for Scientific Research through Crowdfunding,” 71.

³⁵ Hui and Gerber, “Crowdfunding Science,” 31.

³⁶ Wheat et al., “Raising Money for Scientific Research through Crowdfunding,” 72.

Experiment because the platform hosts a broad range of research topics with strong variation in the amount of funding being requested. Additionally, Experiment is the specific platform named in the majority of the literature and it appears to be the platform most advocates of crowdfunding encourage researchers to use.

Originally called Microryza, Experiment was launched in 2012 by a trio of university students who were frustrated with the lack of funding opportunities for students and early-career researchers (ECRs).³⁷ In their guide for researchers, the Experiment team states that their platform is designed for researchers “who are eager to share their journey with the world” and that there is no age, background, or skill level required to launch a campaign on their platform.³⁸ Projects are evaluated on three criteria: a clear hypothesis or research question, scientifically accurate content, and feasibility.³⁹ These criteria are also important to more traditional funding sources, but previous work and existing credentials can account for as much as half of how a proposal is scored, especially for student proposals.⁴⁰ Projects that include human or animal subjects must have documentation of approval from the researchers’ institutional review board prior to campaign approval.⁴¹ The site leads interested researchers through a guide on how to create a strong campaign.⁴² Unlike other crowdfunding platforms, which encourage the

³⁷ Hollie Slade, “Experiment Is Crowdfunding Science Projects, Just Don’t Ask Them To Find Bigfoot,” *Forbes*, accessed February 3, 2020, <https://www.forbes.com/sites/hollieslade/2014/02/07/experiment-is-crowdfunding-science-projects-just-dont-ask-them-to-find-bigfoot/>.

³⁸ “Researcher Guide - Design,” Experiment - Moving Science Forward, accessed February 3, 2020, <https://experiment.com/guide/design>.

³⁹ “Researcher Guide - Design.”

⁴⁰ Social Sciences and Humanities Research Council of Canada Government of Canada, “Social Sciences and Humanities Research Council: SSHRC Doctoral Fellowships,” May 11, 2012, <https://www.sshrc-crsh.gc.ca/funding-financement/programs-programmes/fellowships/doctoral-doctorat-eng.aspx>.

⁴¹ “Researcher Guide - Design.”

⁴² “Researcher Guide - Design.”

use of incentives to entice contributors, Experiment operates on the premise that the generation of new science is reward enough for contributors. The guidelines for researchers describe strong experiments as stories “with many layers, characters, twists, and turns. As a scientist, your goal is to let that story connect with the public.”⁴³

Currently, there is a limited but informative literature on the use of crowdfunding in academic research, mainly in the sciences and social sciences. While some of this literature exists to inform the academic community about this funding model,^{44,45} other papers provide the research community with suggestions for how to create their own successful crowdfunding campaigns.⁴⁶ In their 2016 guide to scientific crowdfunding, Vachelard et al. systematically explain a number of ways that researchers can launch and achieve success with crowdfunding campaigns. Some of their suggestions include: the use of strong communication that uses little to no academic jargon, the involvement of as many individual contributors as possible, the setting of realistic financial goals, and transparency with respect to the use of funds and goals of the project.⁴⁷ These suggestions are corroborated elsewhere in the literature as well as in Experiment’s guide for researchers.^{48,49}

From a scan of Experiment’s funding pages, it is readily apparent that the majority of the projects listed on the site are being undertaken by students of varying levels or

⁴³ “Researcher Guide - Design.”

⁴⁴ Wheat et al., “Raising Money for Scientific Research through Crowdfunding.”

⁴⁵ Hui and Gerber, “Crowdfunding Science.”

⁴⁶ Vachelard et al., “A Guide to Scientific Crowdfunding.”

⁴⁷ Vachelard et al., 3–5.

⁴⁸ Wheat et al., “Raising Money for Scientific Research through Crowdfunding,” 72.

⁴⁹ “Researcher Guide - Design.”

ECRs. This observation is further confirmed by a statistic from Experiment that as of 2015, 58 percent of projects on the site were led by young researchers with limited experience conducting and sharing research with general audiences.⁵⁰ There are a number of reasons why young researchers may see Experiment as a solution to their financial situation. The publicness of platforms like Experiment make it an accessible, professional avenue for novice researchers to network with more senior members of their field and provides a reason to contact them about their work outside of academic conferences.⁵¹ The work these young researchers produce as part of their crowdfunded projects can serve as confidence-building activities that can prepare them for future grant applications.⁵² The networking aspect of sites like Experiment can also be appealing for researchers from low and middle-income countries (LMICs), who may have even more limited access to funding than their counterparts living in high-income countries (HICs).⁵³ According to a 2013 document from The World Bank, the use of general crowdfunding sites (i.e. those not specifically tied to research) appeared promising.⁵⁴ Part of the reason for this optimism was the ability for crowdfunding to connect members of religious, cultural, or regional diasporas to members back in their homeland, thus creating a new emotional connection and desire to “strengthen their country or population of origin.”⁵⁵

This connection between researchers in LMICs and funders living in diaspora communities can open a broader question: who contributes to crowdfunding campaigns

⁵⁰ Hui and Gerber, “Crowdfunding Science,” 32.

⁵¹ Hui and Gerber, 37.

⁵² Hui and Gerber, 38.

⁵³ Vachelard et al., “A Guide to Scientific Crowdfunding,” 1.

⁵⁴ The World Bank, “Crowdfunding’s Potential for the Developing World,” 2013, 32.

⁵⁵ The World Bank, 35.

for academic research? The success of crowdfunding campaigns both in research and beyond often depends on the social and professional network of those seeking funding.⁵⁶ As with many more general crowdfunding campaigns, many contributors to campaigns are “non-experts” with an interest in the research project being proposed.⁵⁷ In their guide for researchers launching crowdfunding campaigns, Vachelard et al. encourage researchers to mention their campaigns in professional and academic circles in addition to their personal networks.⁵⁸ This interest can be maintained by keeping contributors updated on the equipment being used to conduct the research, advances through a study once funded, and by demonstrating the passion many researchers naturally have for their chosen field of study.⁵⁹ Vachelard et al. argue that contributors deem passion to be as important as trustworthiness in electing to contribute to a crowdfunding campaign and add that a consistent stream of communication can aid in the demonstration of the former and the development of the latter.⁶⁰

In addition to these traits, what types of research initiatives achieve financial success on sites like Experiment? The platform boasts a panoply of projects covering a diverse array of topics. Previous initiatives funded by backers on Experiment include “Transforming Styrofoam waste into biodegradable plastic,”⁶¹ “The Cookie Monster:

⁵⁶ Vachelard et al., “A Guide to Scientific Crowdfunding,” 3.

⁵⁷ Hui and Gerber, “Crowdfunding Science,” 35.

⁵⁸ Vachelard et al., “A Guide to Scientific Crowdfunding,” 3.

⁵⁹ Hui and Gerber, “Crowdfunding Science,” 35.

⁶⁰ Vachelard et al., “A Guide to Scientific Crowdfunding,” 3–4.

⁶¹ Experiment, “Transforming Styrofoam Waste into Biodegradable Plastic,” accessed February 4, 2020, <https://experiment.com/projects/engineering-e-coli-to-produce-biodegradable-plastics-from-styrofoam?s=discover>.

How does the type of sugar affect different cookies?”⁶² and “Does index to ring finger length ratio indicate sexual orientation?”⁶³ Each of these projects surpassed their respective funding goals. In addition to the need for a clear, compelling hypothesis or research question required by Experiment,⁶⁴ the successful projects on the site along with the existing literature illustrate the importance of setting the right financial goal.⁶⁵ Researchers are encouraged to submit projects that require at most a few thousand US dollars, though larger sums have been requested and fully funded.⁶⁶ The selection of the funding goal is especially important on a site that operates the way Experiment does, where projects that are not fully funded receive none of the money pledged by the supporters who did contribute to the campaign.⁶⁷ The process through which projects are granted funds is still complicated in crowdfunding, which prompts questions about what advantages researchers who wish to crowdfund see in the process.

1.4 Advantages of the crowdfunding model in research contexts

The literature suggests that there are some distinct advantages to the use of crowdfunding in research as opposed to more traditional grant-based funding. While I will later discuss the issues, dilemmas, and current shortcomings of the crowdfunding

⁶² Experiment, “The Cookie Monster: How Does the Type of Sugar Affect Different Cookies?,” Experiment.com, accessed February 4, 2020, <https://experiment.com/projects/the-cookie-monster-how-does-the-type-of-sugar-affect-different-cookies>.

⁶³ “Does Index to Ring Finger Length Ratio Indicate Sexual Orientation?,” Experiment - Moving Science Forward, accessed February 3, 2020, <https://experiment.com/projects/does-index-to-ring-finger-length-ratio-indicate-sexual-orientation>.

⁶⁴ “Researcher Guide - Design.”

⁶⁵ Vachelard et al., “A Guide to Scientific Crowdfunding,” 4.

⁶⁶ Vachelard et al., 4–5.

⁶⁷ Wheat et al., “Raising Money for Scientific Research through Crowdfunding,” 72.

model, this section is intended to serve as an overview of the goals of crowdfunding platforms and their proponents.

As previously discussed, experience with a crowdfunded campaign can give students and early-career researchers a better sense of the skills required to propose a research initiative for future funding opportunities.⁶⁸ In addition to requiring strong written communication, researchers must meet with a member of the Experiment staff to discuss the project and ensure that it has been proposed by a team that has the skills to complete the project if funded.⁶⁹ Beyond the opportunity to gain research experience, successfully crowdfunding a research initiative demands a unique skillset that is not always developed in academia. Many researchers view crowdfunding as a way to more directly interact with the public and demonstrate their research methods for a broader audience, sometimes acting as mentors in the process.⁷⁰ The public forum of crowdfunding sites allows researchers to share their passion for their subject in ways traditional grants do not.⁷¹ This direct engagement can be reciprocal as well; the questions and comments posed by contributors can stimulate creativity and lead researchers to new solutions.⁷²

In addition to the benefits of public engagement, a commitment to a crowdfunding campaign demands that researchers develop communication and technology skills that may not be part of their school curriculum or day jobs. These skills range from the

⁶⁸ Hui and Gerber, “Crowdfunding Science,” 38.

⁶⁹ Nicole Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies, August 4, 2020.

⁷⁰ Hui and Gerber, “Crowdfunding Science,” 35.

⁷¹ Hui and Gerber, 35.

⁷² Hui and Gerber, 35.

translation of complex academic ideas into more concise statements that hold greater appeal for the “outside world.”⁷³ The translation of knowledge — especially in health sciences — has been widely documented as a positive action, and there is evidence to indicate that the use of social media and other online platforms can aid in knowledge translation.⁷⁴ In the context of Experiment, researchers can influence and change their audience’s ideas about their research, which can enhance interest in their chosen field. This is why the aforementioned passion for the topic of one’s research is so important. Although demonstrated in a different manner than in a traditional grant application, interest and passion can convey competence to a more general audience, and researchers are encouraged to keep the content they create for their campaign (e.g. YouTube videos, blog posts, and forum posts) succinct and engaging in their tone.⁷⁵

The demand for outward passion may seem to be a difficult request, especially given that charisma and a love for public speaking are not inherent requirements for a successful career in research, but many researchers are excited at the prospect of sharing their work with an audience that extends beyond their peers.⁷⁶ Researchers who have launched crowdfunding campaigns have cited “the little [emotional] rush” that results from the notification that an individual has donated to their campaign.⁷⁷

⁷³ Hui and Gerber, 36.

⁷⁴ Livia Puljak, “Using Social Media for Knowledge Translation, Promotion of Evidence-Based Medicine and High -Quality Information on Health: Social Media and Knowledge Translation,” *Journal of Evidence-Based Medicine* 9, no. 1 (February 2016): 5, <https://doi.org/10.1111/jebm.12175>.

⁷⁵ Vachelard et al., “A Guide to Scientific Crowdfunding,” 3–4.

⁷⁶ Hui and Gerber, “Crowdfunding Science,” 35.

⁷⁷ Hui and Gerber, 38.

There are also more pragmatic advantages to crowdfunding research projects. The grant application process is long, paperwork heavy, and is typically followed by a long period of waiting for results. In contrast, crowdfunding can move much faster; there is far less paperwork involved, and there is a greater chance of receiving financial support quickly. This is especially useful for researchers who may need to quickly raise money mid-project for new equipment, or for graduate student researchers in difficult financial situations.⁷⁸ Furthermore, while the success rate among initiatives submitted to the NSF hovers around 25 percent,⁷⁹ Experiment boasts a success rate closer to 50 percent — the site’s FAQ reports a success rate of 46 percent.⁸⁰ While there is a serious time commitment required of researchers hoping to crowdfund their projects, many see Experiment and related sites as a better opportunity to spend time on.⁸¹

In this section I have discussed the merits and talking points in favour of the use of crowdfunding for research. In the following section, and subsequently in the following two chapters, the majority of my discussion of these platforms will turn to critique.

1.5 Disadvantages of crowdfunding research projects

The distinct advantages of the crowdfunding model for academic research show promise that research and research funding can adapt to modern financial realities for many researchers. However, this model is not without its own shortcomings. As with traditional grant-based funding, there is no guarantee that proposed projects will receive

⁷⁸ Hui and Gerber, 37.

⁷⁹ US NSF, "About Funding."

⁸⁰ Experiment, "Frequently Asked Questions," accessed February 5, 2020, <https://experiment.com/faq>.

⁸¹ Hui and Gerber, "Crowdfunding Science," 38.

any support, and while any completed grant proposal is likely to be read by those who allocate the funding, not every proposal sent to Experiment is given a platform to raise funds.⁸² Experiment’s goal is not to exclude interested researchers from proposing and completing projects, however the platform’s staff have a responsibility to ensure that the projects are feasible and that researchers understand the mechanics of the crowdfunding model. In my subsequent chapters, I will critique this review process, but it is worth noting that, at least on Experiment, there is some review infrastructure in place. In addition, many research-focused crowdfunding platforms, Experiment included, operate on an “all-or-nothing” funding model, which means that any initiative that does not meet or exceed its funding goal receives none of the money pledged by contributors.⁸³ For example, if Prof. Doe sets her funding goal to \$4,000 and only receives \$3,400 in pledges, she receives none of the money she has raised and the money pledged to her campaign is returned to the would-be donors. While the odds may be different from those of more traditional funding avenues, researchers who choose to crowdfund are still not guaranteed any funding.

In addition to the uncertainty about receiving funding that puts crowdfunding on par with other funding avenues, there are two distinct disadvantages associated with crowdfunding platforms. The first pertains to the time required to develop the skillset successful crowdfunding demands of its users. While it can be argued that these skills (e.g. video creation and editing, blog writing) can be beneficial to the holistic

⁸² Experiment, “Frequently Asked Questions”

⁸³ Experiment, “Researcher Guide - Design.”

development of a graduate student or young professional, the time required to hone those skills is often an inconvenience at best and more often than not a tremendous difficulty.⁸⁴ Furthermore, given that the majority of those seeking crowdfunding for their research are either students or ECRs, the likelihood is that they have limited finances and employment security that may add to the strain of pursuing a crowdfunding campaign. One could argue that crowdfunding much like traditional funding simply has its own disadvantages for ECRs. Although this is not specifically articulated in the literature, one of the potential advantages of crowdfunding is that it can serve as a preliminary proof-of-concept for later funding applications.⁸⁵ However, as I will discuss more thoroughly in my third chapter, crowdfunding is purported to be a system that can better support students and ECRs.⁸⁶ If this claim is true, then the requirement that researchers possess or learn unrelated skills to launch a successful crowdfunding campaign does not make the process more supportive for ECRs; it simply changes where the difficulty lies.

There are other factors beyond researchers' control that may be detrimental to their crowdfunding campaigns, and not every factor is within fundraisers' control. One of the most concerning is herding behaviour, which occurs when patrons contribute to an initiative because it already has a large following and is therefore deemed a "safe" option.⁸⁷ This is less of an issue with a platform that operates in the manner that Experiment does because no pledges are sent until the fundraising goal is met. However,

⁸⁴ Hui and Gerber, "Crowdfunding Science," 38.

⁸⁵ Averett, "With Funding Tight, Researchers Tap the Public," 908.

⁸⁶ Vachelard et al., "A Guide to Scientific Crowdfunding," 1.

⁸⁷ Ian McDougall, "An Analysis of Crowdfunding Data," 2013, 2.

this herding behaviour can affect which initiatives receive funding, and in turn, drive the course of future research projects.

1.6 Previewing problem areas: crowdfunding and the “wild west” of research funding

Through this illustration of the state of affairs of crowdfunding, I have found a number of serious concerns related to the structure of and claims made about the application of crowdfunding platforms to fund research projects. These issues and their potential solutions will take up the remainder of my project. I have selected two main categories into which these issues can be divided: ethical dilemmas and social inequalities crowdfunding allegedly remedies. Taken together, I believe these two sets of issues — each with their own chapter — will convey my concern for the state of crowdfunding for research on both ethical and social levels.

My second chapter will focus on ethical issues related to governance, trust and accountability, and transparency. I believe that there are significant flaws in the structure of crowdfunding platforms that hinder the facilitation of important ethical review procedures. It is also important to consider the ways that trust and accountability can be facilitated in a novel, digital environment. Finally, there is little infrastructure in place to ensure or at least promote transparent communication between researchers and their funders.

My third chapter will focus on an argument against the claims that the crowdfunding model broadens and democratizes academic research. Advocates for the use of crowdfunding in academic research claim that these platforms allow for more frequent and significant contributions to the advancement of research from students and

early-career researchers and researchers from LMICs.^{88,89} I will critique this claim by evaluating three areas where crowdfunding is allegedly a more inclusive system. The allocation of money drives research forward, and while it is tempting to make the argument that crowdfunding allows individual citizens a “voice” in the allocation of research funding, I want to investigate whose “voices” are actually heard through the commitment of financial support. Who is able to give this support? If only wealthy citizens can afford to contribute to crowdfunding campaigns, how can members of non-wealthy classes indicate their support for a cause in a meaningful way? I will then investigate the claims that crowdfunding is a more accessible avenue for funding, especially for lower-income researchers. Finally, in a return to the “big picture” view of my second chapter, I will argue how crowdfunding may threaten the legitimacy of academic research as we understand it today, but also how this change in prestige may spell interesting changes for how we, as academics and private citizens, conceive of research in general.

Following these two central arguments, I will propose resolutions to some of the highlighted issues. As with any other advancement in academia, research, and technology, no single development can completely remedy longstanding issues. However, through thorough examination and careful analysis, I hope to present a case that demonstrates how crowdfunding platforms can be better understood by researchers and

⁸⁸ Vachelard et al., “A Guide to Scientific Crowdfunding,” 1.

⁸⁹ Hui and Gerber, “Crowdfunding Science,” 33.

institutions, and how this understanding can have a positive effect on the future of research.

Chapter 2: *Nullius in verba*: a brief history of modern science and how crowdfunding changes the normative paradigm of ethical research

2.1 Introduction: Welcome to the Wild West

The format, methods, and structure of conducting research have changed in both obvious and more subtle ways over the course of history. From the founding of the Royal Society to promote scientific discussion to spirited lab meetings amongst researchers today, the manner in which research is supported, questioned, and understood — and by whom — has shifted to include more than the elite members of society. The funding of such research, however, has traditionally come from one of a handful of places, such as governmental organizations, universities and other academic institutions, and private companies. Crowdfunding has introduced a novel way for researchers to garner financial support for their work, but this avenue is a regulatory Wild West with few requirements set for those wishing to fundraise on such a platform.⁹⁰ To date, there are few mechanisms in place to solidify positive relationships between researchers using crowdfunding platforms and their supporters. The current state of crowdfunding has not created a secure environment in which supporters can reliably trust those raising money beyond a “gut check.”

In this chapter, I will first demonstrate that historically, despite the long history of scientific discussion in Western philosophical tradition, research was an endeavour an elite few were able to undertake. This is less true today, but I will argue that research is still an opportunity that remains out of reach for many people. I will argue that the use of

⁹⁰ Christine Hurt, “Pricing Disintermediation: Crowdfunding and Online Auction IPOs,” *SSRN Electronic Journal*, 2014, 220, <https://doi.org/10.2139/ssrn.2406205>.

crowdfunding can broaden the scope of who is involved in the production and funding of research, and that while this can create a positive effect, there is currently too much potential for misuse of crowdfunding platforms due to key shortcomings in governance, accountability, and transparency. A lack of strong governance means that currently there are no strong oversight mechanisms in place for the crowdfunding of research. This issue, compounded with the fact that the current state of the crowdfunding landscape is not one where trust can easily be built, has led to the creation of a digital space where accountability is difficult to demonstrate and guarantee. Finally, I will argue that while researchers and the public can both hope for better transparency of research and dissemination of results due to crowdfunding, there are infrastructural differences in some research communities that can inhibit these efforts.

I see these three issues as central to the ethical function and integrity of platforms such as Experiment largely because judgment-based decisions are particularly difficult to make in a digital space.⁹¹ One of the strengths of digital knowledge dissemination is its seeming ability to deliver quickly and at marginal expense. However, as Onora O’Neill explains in her recent work on trust and accountability in digital contexts, the introduction of mechanisms to act as intermediaries and gatekeepers in the digital dissemination of knowledge are more difficult to regulate and understand than their old-world (i.e. physical) counterparts.⁹² I have drawn attention to governance, trust and accountability, and transparency because I believe that proper understanding of their importance and

⁹¹ Onora O’Neill, “Trust and Accountability in a Digital Age,” *Philosophy* 95, no. 1 (January 2020): 5, <https://doi.org/10.1017/S0031819119000457>.

⁹² O’Neill, 8.

regulation of their implementation can turn crowdfunding into a legitimate, powerful new tool for funding research. As I will illustrate in the section immediately following, this shift to digital organization and funding of research is not unprecedented; the development of modern research as we understand it today demanded a similarly rigorous set of values. And while the Royal Society has had champions to prescribe its conduct, crowdfunding is in need of regulators to perform the equivalent of these tasks in the 21st century.

2.2 The Royal Society and the dawn of modern science

In 1660, the Royal Society of London was founded by an eminent group of scientists — then called natural philosophers.⁹³ In the group’s early years, members made numerous advances in various scientific pursuits. Members discussed physics, astronomy, mechanics, anatomy, and other “natural experiments.”⁹⁴ The Royal Society published work by figures such as Robert Hooke, Isaac Newton, and Benjamin Franklin, and shortly after the formation of the society, its members established *Philosophical Transactions*, which is now the oldest continuously published scientific journal in the world.⁹⁵ The group’s overall approach to research conduct and the dissemination of research results has contributed to the research structure still employed today.⁹⁶

Much of this approach to natural philosophy can be attributed to Francis Bacon. Although he died prior to the Royal Society of London’s foundation, the group is cited as

⁹³ “History of the Royal Society | Royal Society.”

⁹⁴ Syfret, “The Origins of the Royal Society,” 76.

⁹⁵ Syfret, “The Origins of the Royal Society.”

⁹⁶ “History of the Royal Society | Royal Society.”

one of the “earliest practical fruits” of Bacon’s philosophical work.⁹⁷ Bacon is seen as the “spiritual father” of the Royal Society, and historians have found it logical that 17th century scientists would have wanted to follow the work Bacon had laid out in the decades prior.⁹⁸

Bacon laid the groundwork for a research program that focused on progress and discovery rather than controversies and conflict between religion and science.⁹⁹ Bacon was an advocate for the separation of the church and science, though he did see them as complementary studies.¹⁰⁰ He detailed this further in an unfinished novel called *Nova Atlantis*, a utopian fantasy in which he envisioned Salomon’s House, an organization devoted to “the study of the works and creatures of God.”¹⁰¹ In Bacon’s fantasy, members of the house are responsible for the production and dissemination of knowledge about science, the arts, and manufacturing.¹⁰² Through this fictional account, Bacon argued for the formation and support of a research group akin to Salomon’s House, a cause he petitioned King James I to patronize.¹⁰³ In Bacon’s view, moral progress and the progress of civilization are closely linked to the development of science,¹⁰⁴ an argument he lays out in *Nova Atlantis* through the existence and high social status of the House of Salomon.¹⁰⁵ While Bacon died before the Royal Society was founded, historians assert

⁹⁷ Syfret, “The Origins of the Royal Society,” 85.

⁹⁸ Syfret, 85–86.

⁹⁹ Jürgen Klein, “Francis Bacon,” December 29, 2003, <https://plato.stanford.edu/entries/francis-bacon/>.

¹⁰⁰ Klein.

¹⁰¹ Bacon, *Bacon’s Advancement of Learning and The New Atlantis*, 255.

¹⁰² Bacon, 256.

¹⁰³ Denise Albanese, “The New Atlantis and the Uses of Utopia,” *ELH* 57, no. 3 (1990): 508, <https://doi.org/10.2307/2873232>.

¹⁰⁴ Klein, “Francis Bacon.”

¹⁰⁵ Bacon, *Bacon’s Advancement of Learning and The New Atlantis*, 255.

that its structure and mandate are based on his various proposals for a new approach to the generation of science and his vision of an institution such as Salomon's House.¹⁰⁶

Although I would argue that traditional research is largely still a practice restricted to the highly educated, the university lab or research institution is a different landscape than the early meetings of the Royal Society.

Prior to the Scientific Revolution and the eventual formation of the Royal Society, the development and progress of science was a practice that placed emphasis and value on secrecy and the upholding of science as a private matter only elite intellectuals were able to partake in.¹⁰⁷ The push towards more public scientific discussion persisted over the centuries and has become the fairly “open” approach to science used by researchers, students, and corporate labs alike today.¹⁰⁸ Naturally, as decades and centuries passed, certain practices, approaches, and techniques to conducting science were shared and copied, and in 1942, sociologist of science Robert K. Merton published what are still regarded as the governing norms of conducting scientific research. Merton characterized these norms as communism, universalism, disinterestedness, and organized scepticism.¹⁰⁹ Sometimes abbreviated to the acronym “CUDOS”, Merton argued that

¹⁰⁶ Syfret, “The Origins of the Royal Society,” 86.

¹⁰⁷ Paul A. David, “Understanding the Emergence of ‘Open Science’ Institutions: Functionalist Economics in Historical Context,” *Industrial and Corporate Change* 13, no. 4 (2004): 575–76, <https://doi.org/10.1093/icc/dth023>.

¹⁰⁸ David, 575.

¹⁰⁹ Merton, “A Note on Science and Democracy,” 118.

these norms can be identified as the “ethos of modern science.”¹¹⁴ **Table 1** summarizes Merton’s four norms.

Merton’s norms, while well-established in science, are not without their critics. In 1974, Ian Mitroff published a quartet of observed norms that proved contrary to Merton’s. He listed solitariness, particularism, interestedness, and organized dogmatism as norms that can also sway the progress of science.¹¹⁵ Still others have dismissed Mertonian and anti-Mertonian norms. One of the most well-known dissidents of both Merton’s norms and Mitroff’s counternorms is Michael Mulkey, who described both Merton’s and Mitroff’s norms as “vocabularies of justification” rather than institutionalized norms within the scientific community.¹¹⁶

Communism	Scientific findings rely on social collaboration and denote a “common heritage” among researchers. Communism in science denounces secrecy and necessitates communication. ¹¹⁰
Universalism	Scientific claims cannot be evaluated based on attributes of those who make them. Universalism requires the rejection of ethnocentrism, which, in times of international conflict, can put strain on scientists. However in order to do good science, universalism must be maintained. ¹¹¹
Disinterestedness	Researchers cannot be motivated by self-interest. Different from curiosity, disinterestedness entails the pursuit of science for reasons other than personal gain. ¹¹²
Organized scepticism	This norm requires researchers to present findings with transparency and consumers of scientific findings to withhold judgment until those findings have been examined. ¹¹³

Table 1 A summary of Mertonian norms

¹¹⁰ Merton, 121–22.

¹¹¹ Merton, 118–19.

¹¹² Merton, 124–25.

¹¹³ Melissa S. Anderson et al., “Extending the Mertonian Norms: Scientists’ Subscription to Norms of Research,” *The Journal of Higher Education* 81, no. 3 (May 1, 2010): 3, <https://doi.org/10.1353/jhe.0.0095>.

¹¹⁴ Merton, “A Note on Science and Democracy,” 118.

¹¹⁵ Anderson et al., “Extending the Mertonian Norms,” 4.

¹¹⁶ Michael J. Mulkey, “Norms and Ideology in Science,” *Social Science Information* 15, no. 4–5 (August 1, 1976): 653–54, <https://doi.org/10.1177/053901847601500406>.

Mertonian norms are of course not the only scientific norms to have been argued for (or against), but I think they capture much of the spirit the general public attributes to the research community, along with the degree of trust they have in researchers.

Academics writing in the 21st century have continued to support Merton's four norms, and have defended them as hallmarks of trust in science.¹¹⁷

In the traditional, institutionally-funded process of conducting research, Mertonian norms have been preserved to a degree, although research by Benner and Sandström has shown that funding agencies affect the structure and replication of academic research in addition to having sway over how fields change over time.¹¹⁸ Agencies, governmental grants, and internal funding opportunities are frequently siloed into focus areas, an action Benner and Sandström argue that directs researchers to propose research that aligns with extant funding opportunities.¹¹⁹ As funding structures change, I believe that it is worth interrogating how those norms morph with them, especially in crowdfunding, where that institutional or agency filter does not exist in the same way.

More recently, researchers have pushed for more open-access availability of research materials and results. Also termed “open science,” this style of research conduct can also be traced back to later works by Merton and is based on the premise that the

¹¹⁷ Piotr Sztompka, “Trust in Science: Robert K. Merton's Inspirations,” *Journal of Classical Sociology* 7, no. 2 (July 1, 2007): 211, <https://doi.org/10.1177/1468795X07078038>.

¹¹⁸ Mats Benner and Ulf Sandström, “Institutionalizing the Triple Helix: Research Funding and Norms in the Academic System,” *Research Policy* 29, no. 2 (February 2000): 293, [https://doi.org/10.1016/S0048-7333\(99\)00067-0](https://doi.org/10.1016/S0048-7333(99)00067-0).

¹¹⁹ Benner and Sandström, 293.

acquiring of knowledge is an innately social process.^{120,121} Open science can entail the sharing of data or code, methods and materials with other researchers, the publishing of work in journals that do not limit who is able to access their articles, and more extensive peer review through having a stronger understanding of the research methods used in an experiment or study.¹²² The intellectual push during and just after the Scientific Revolution saw the removal of the shroud of secrecy around research, a process that continued for the centuries that followed. Research and experimentation became entangled with the ivory tower and university education, and as higher education became accessible to a larger percentage of the population, the opportunity to do research was extended to more students and young academics. In many ways, the open science movement of the 20th century is the logical continuation of this trend. Much like the adoption of crowdfunding, ECRs are most likely to be the researchers subscribing to this style of conducting research.¹²³ And, much like crowdfunding, while there are benefits to the commitment to open science practices, such as the increased reliability of knowledge produced, there are also opportunities for added strife, such as the inflexibility of shared, open research methods and the lack of incentive (i.e. the allure of publication) for persevering under an open science framework.¹²⁴ Not every open science project is

¹²⁰ Arijit Mukherjee and Scott Stern, “Disclosure or Secrecy? The Dynamics of Open Science,” *International Journal of Industrial Organization* 27, no. 3 (May 2009): 449, <https://doi.org/10.1016/j.ijindorg.2008.11.005>.

¹²¹ Paul A. David, “Common Agency Contracting and the Emergence of ‘Open Science’ Institutions,” *The American Economic Review* 88, no. 2 (May 1998): 16.

¹²² Christopher Allen and David M. A. Mehler, “Open Science Challenges, Benefits and Tips in Early Career and Beyond,” *PLOS Biology* 17, no. 5 (May 1, 2019): 2, <https://doi.org/10.1371/journal.pbio.3000246>.

¹²³ Allen and Mehler, 1.

¹²⁴ Allen and Mehler, 2–6.

crowdfunded, and not every crowdfunded project uses open science methodology (though crowdfunding platforms do encourage their users commit to open-access publication), but the push towards better observability of how research is conducted is an ongoing trend in the scientific process.¹²⁵

I have laid out these historical events and discussions of norms because they provide context for the current environment in which research exists. I believe we can view the advent of crowdfunding for research as a paradigm shift akin to the creation and sponsorship of learned organizations such as the Royal Society. Much like how the funding of initiatives launched by Fellows of the Royal Society shaped much of science in the 1600s and consequently the following centuries, the advent of crowdfunding has the potential power to shape the next several decades or centuries of research. Norms such as, but not limited to, Merton's CUDOS model allow for the parsing of particular actions or research plans as ethical or inappropriate. The trend towards increasingly open science may change the focus or content of the norms that govern the production of research, although I do not foresee a complete scrapping of Merton's CUDOS model. If anything, I believe communism and organized scepticism will become more important as larger communities become more involved in the production and funding of research. A broader discussion of how these norms may continue to change is one I believe to be valuable, however it is deserving of its own project.

In the sections below I will explore and evaluate three key issues at play in the use and regulation of crowdfunding in research: issues of governance, trust and

¹²⁵ "Frequently Asked Questions."

accountability, and transparency. Each of these concepts are closely related to the Mertonian norms of communism and organized scepticism, and they are integral in maintaining a positive and open relationship between researchers and the general public. There are readily observable issues in crowdfunding related to each of these aspects of crowdfunded research. I will reveal these issues and argue that if the practice of crowdfunding for research initiatives continues in its current, unchecked manner, any positive relationship between the public and researchers could be lost in the structural shift. Crowdfunding has been described as a “Wild West” in multiple publications.^{126,127} While this environment can present new opportunities and provide necessary pushes towards novel developments in technology, ethics, the structure of research, and the relationship between the public and researchers, it is also necessary that researchers be held to certain standards, regardless of where they receive their financial support.

2.3 Issues of Governance

Most traditional (i.e. governmental or institutional) funding agencies provide specific application criteria and have a standard set of expectations for how research unfolds if or when funding is granted. For example, SSHRC is the governing body for social science and arts research conducted by Canadian researchers. SSHRC lists a number of eligibility criteria at the beginning of its “How to Apply” webpage, below which are other pages on subject matter eligibility and further administrative

¹²⁶ Hurt, “Pricing Disintermediation,” 220.

¹²⁷ Martin Andreas Heese, “Investments in the Wild West: How Failure and Fraud Affect Trust and Contributions in Crowdfunding,” *Academy of Management Proceedings* 2017, no. 1 (August 1, 2017): 17, <https://doi.org/10.5465/AMBPP.2017.13974abstract>.

requirements for creating an application.¹²⁸ Some funding opportunities are for students or early-career researchers, but many are for specific areas of research in which SSHRC or the Canadian government have an interest. For example, in the months following the emergence of the COVID-19 pandemic, SSHRC’s sibling agency, CIHR launched a new initiative inviting researchers to contribute to the early global response to the novel coronavirus.¹²⁹ Other SSHRC funding opportunities are more generic, with a focus on healthy communities, national defence, artificial intelligence, or “new frontiers” in social science and humanities research.¹³⁰ Once an application is created for a specific initiative supported by SSHRC, applicants must fill out a number of forms demonstrating their credentials, background work, and other qualifications that prove their ability to complete the proposed project. SSHRC, CIHR, and their science counterpart NSERC share a framework for responsible research.¹³¹ If a project is funded, researchers cannot be found in breach of the agency’s policies or commitments to the production of research. Breaches include plagiarism, falsification or destruction of research results, conflict of interest, the use of incorrect or incomplete information in an application, and misuse of funds.¹³²

¹²⁸ Social Sciences and Humanities Research Council of Canada Government of Canada, “Social Sciences and Humanities Research Council: How to Apply for a SSHRC Grant, Scholarship or Fellowship - General Instructions,” May 11, 2012, <https://www.sshrc-crsh.gc.ca/funding-financement/apply-demande/index-eng.aspx>.

¹²⁹ Canadian Institutes of Health Research Government of Canada, “Launch of the Canadian 2019 Novel Coronavirus (COVID-19) Rapid Research Funding Opportunity - CIHR,” February 4, 2020, <https://cihr-irsc.gc.ca/e/51868.html>.

¹³⁰ Social Sciences and Humanities Research Council of Canada Government of Canada, “Social Sciences and Humanities Research Council: Funding Search Tool,” May 11, 2012, https://www.sshrc-crsh.gc.ca/funding-financement/search_tool-outil_de_recherche-eng.aspx.

¹³¹ Together, SSHRC, CIHR, and NSERC form the Tri-Council, sometimes referred to as the Tri-Agency. I will refer to them as the Tri-Council when discussing them as a singular administrative and governing body.

¹³² Secretariat on Responsible Conduct of Research (Canada) et al., *Tri-Agency Framework, Responsible Conduct of Research*, 2016, 6–7, http://epe.lac-bac.gc.ca/100/201/301/weekly_acquisitions_list-ef/2017/17-17/publications.gc.ca/collections/collection_2017/crr-rcr/RR4-1-2016-eng.pdf.

While completing an application for a Tri-Council agency grant (or that of an international analogue) can present researchers with a significant administrative workload, and that researchers may feel as though they are forced to fit their work into narrow categorizations, I would argue that the structure and process act as mechanisms meant to embody good governance. My goal in this section is not to debate the definition of governance; the Institute on Governance (IoG) provides a detailed and clear definition for governance in a practical context.¹³³ The IoG conceives of governance as the determination of who wields decision-making power, whose voices are heard, and how accountability is maintained.¹³⁴ By enforcing strict application policies which may be taxing for researchers, each of the Tri-Council agencies can evaluate applications and uphold their vision as a fair, ethical governing body. According to the IoG, there are five principles of good governance: legitimacy and voice, strategic vision, responsiveness and effectiveness, fairness, and accountability, the latter of which I will elaborate on in the subsequent section.¹³⁵ This ethos is reflected in the Tri-Council's expectations of researchers and in their own governance policy and council.¹³⁶ As explained earlier in this section, Canadian researchers are bound by the Tri-Council's framework for responsible research. They cannot be found in breach of this framework, which can include the

¹³³ The IoG is an independent Canadian institution that aims to improve the understanding of governance, especially "good governance" both in Canada and internationally.

¹³⁴ Institute on Governance, "What Is Governance?," text/html, Institute on Governance (Institute on Governance, July 13, 2020), <http://iog.ca/>, <http://iog.ca/what-is-governance/>.

¹³⁵ Governance.

¹³⁶ Social Sciences and Humanities Research Council of Canada Government of Canada, "Social Sciences and Humanities Research Council: Governance," May 11, 2012, https://www.sshrc-crsh.gc.ca/about-au_sujet/governance-gouvernance/index-eng.aspx.

creation of illegitimate claims, the hiding or destruction of findings, or misuse of funds.¹³⁷

One can think of each of these breaches as a violation of one of the five principles of good governance. The Tri-Council agencies are able to maintain good governance over research in Canada so long as each of their funded researchers/research teams, from graduate students to senior faculty-run labs also makes the commitment to uphold each of these principles. While the appropriate Tri-Council agency oversees all research of a certain type, individual project leaders are also in a position of power on a smaller scale. If they cannot maintain good governance in their own research groups, they have gone against the mandate the Tri-Council has put in place to ensure fair, equitable, and valuable research is supported by the general public's money.

Crowdfunding throws a proverbial wrench into the relationship between researchers, funders, and the public. While the Tri-Council holds a firm stance on good research conduct and appropriate use of public funding, sites such as Experiment lack the checks and balances to make the same guarantee. Experiment's project criteria are broad, and while their project guide recommends that researchers be as specific as possible in their application and in their campaign materials, much of their guide reads as suggestion rather than mandate. Their guide contains no information about breaches of policy, good research conduct, proper use of funds, or accountability. And given that projects on Experiment rely on public support, this blatant lack of concern for accountability is a clear ethical issue for platforms like Experiment. Strong governance could introduce vital

¹³⁷ Secretariat on Responsible Conduct of Research (Canada) et al., *Tri-Agency Framework, Responsible Conduct of Research*, 6–7.

change in this respect. The introduction of mandatory criteria for project proposals to fulfill would still encourage rigorous and innovative proposals, but it would also demonstrate Experiment's authority to both researchers and would-be contributors to campaigns.

Experiment's status as a governing body aggregating project proposals is also potentially issue-ridden. Experiment is a for-profit company that claims an 8 percent platform use fee plus a 3-5 percent payment processing fee for all projects that pass their internal review.¹³⁸ Experiment's reviewers do not consider a potential campaign's profitability when conducting a review; the company maintains that the review is largely to ensure the project itself is viable.¹³⁹ Nonetheless, any project that is approved by Experiment's review board is seen as an investment, to a degree. While the Tri-Council views their financial support of research as investment in research output, Experiment generates a profit on every transaction the platform facilitates. I want to argue that this setup leads to a noteworthy conflict of interest, or at the very least demonstrates that some of the platform's information about itself is disingenuous.

Beyond Experiment's veiled goal to maximize its own profit, the platform's review process is neither detailed nor transparent. The site's FAQ page states that a member of the Experiment staff "reviews" every project proposal that is submitted through the online system, and that researchers participate in an interview as part of that review, but there are few details about who on staff conducts the review or what the

¹³⁸ "Frequently Asked Questions."

¹³⁹ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

review itself consists of.¹⁴⁰ Presumably, the staff member tasked with reviewing projects looks for answers to a fairly standard checklist of questions; if approved, is the project likely to reach its fundraising goal? What risks are associated with the project? Is Experiment put at risk by approving this proposal? These questions are speculative; there is no public overview of the kinds of elements that make for a successful project proposal. While Experiment’s guide for researchers is thorough with respect to setting up a successful crowdfunding campaign, the section on project review criteria is comparatively sparse. The company bases its review on three criteria: clarity of hypothesis or research question, scientific accuracy of the project’s content, and the feasibility of the project’s execution.¹⁴¹ The site boasts a 46.5 percent funding success rate, but does not provide a statistic for the percentage of submitted projects initially approved for funding.¹⁴²

A brief aside worth highlighting, however, is that despite Experiment’s opacity on the matter of internal review and approval, the platform clearly outlines its expectations with respect to ethics approval. Any research proposal that involves either human or animal subjects requires proof of ethics approval from researchers’ institutional review board.¹⁴³ Experiment cannot approve ethics proposals, nor does it purport to do so.

¹⁴⁰ “Frequently Asked Questions.”

¹⁴¹ “Researcher Guide - Design.”

¹⁴² “Frequently Asked Questions.”

¹⁴³ “Researcher Guide - Extra,” Experiment - Moving Science Forward, accessed March 5, 2020, <https://experiment.com/guide/extra>.

2.4 Accountability, trust, and the production of research

As mentioned in the previous section, accountability is of vital importance in the maintenance of good governance and maintaining a positive relationship between researchers and the general public. A buzzword used in many sectors, from mass media to public health, I see “accountability” as having become a slang term in some contexts. The term has come to denote a recognition on the part of a party in a position of power that they owe a certain conduct and honesty to their constituents, whether they be publication readers,¹⁴⁴ tattoo shop patrons,¹⁴⁵ or municipal governments.¹⁴⁶ The ubiquity of the terms “accountable” and “accountability” in 2020 is an interesting phenomenon, though not one I can puzzle over here, but any discussion of accountability to the general public would be incomplete without recognizing the seeming frequency with which it is used, especially where tax dollars or voluntary contributions are concerned. The way the public perceives a term is important in this context, as it reframes what the public expects of people in positions of power. This extends to the collection and use of funds for conducting research projects.

Given this expanding usage of the term, I wish to be flexible but clear in my understanding and use of accountability. I appreciate Melvin J. Dubnick’s definition in his paper on accountability and ethics. He describes accountability as a means to steer

¹⁴⁴ Amanda Shapiro, “Keeping Ourselves Accountable,” Bon Appétit, accessed July 14, 2020, <https://www.bonappetit.com/story/keeping-ourselves-accountable>.

¹⁴⁵ @tapestry_collective Tapestry Collective, “Please Read for Important Information” (Instagram, July 13, 2020), <https://www.instagram.com/p/CCjt9RVgZqR/>.

¹⁴⁶ City of Toronto, “Accountability Officers,” City of Toronto (City of Toronto, August 4, 2017), Toronto, Ontario, Canada, <https://www.toronto.ca/city-government/accountability-operations-customer-service/accountability-officers/>.

behaviour based on an “answerability’ to a higher authority”, a definition I believe holds true both for traditionally funded and crowdfunded research.¹⁴⁷ Dubnick also conceives of four types of accountability: general answerability (pertaining to expectations in formal or professional relationships), blameworthiness (pertaining to obligations based on relative social position), liability (pertaining to accountability in a legal context), and attributability (pertaining to expectations of accountability outside the work domain).¹⁴⁸ Each of Dubnick’s more specific cases describes relationships more commonly found in traditional funding models, but his conception of “answerability” is useful in understanding the types of relationships in both agency-funded and crowdfunded research.

Traditional funding models, especially those that provide funding from the government can use their application system to decide where best to allocate taxpayers’ money. Researchers who receive funding through this avenue are accountable to the agency that funds their research. They must comply with SSHRC, NSERC, or CIHR guidelines, and they are bound by a commitment to use funds appropriately, embody academic rigour in their work, and acknowledge sources and sites of conflicts of interest.¹⁴⁹ While these researchers are not in direct contact with the public, the

¹⁴⁷ Melvin J. Dubnick, “Accountability and Ethics: Reconsidering the Relationships,” *International Journal of Organization Theory and Behavior*; Boca Raton 6, no. 3 (Fall 2003): 405, <http://dx.doi.org.libaccess.lib.mcmaster.ca/10.1108/IJOTB-06-03-2003-B002>.

¹⁴⁸ Dubnick, 410-422.

¹⁴⁹ Secretariat on Responsible Conduct of Research (Canada) et al., *Tri-Agency Framework, Responsible Conduct of Research.*, 3–4.

expectations laid out in the Tri-Council’s framework for responsible research exist in part to ensure that public funding is used appropriately.¹⁵⁰

This infrastructure, however, does not exist for non-traditional funding avenues, including crowdfunding. Since there is no mechanism or structure for accountability built into the crowdfunding model, the burden falls on researchers to initiate accountability through a different avenue: trust.

The way I envision trust in this context is akin to Margaret Gilbert’s description of a certain kind of reciprocal relationship she calls a joint commitment. In her 2018 book *Rights and Demands: A Foundational Inquiry*, Gilbert advances an account of joint commitments as separate from individual commitments. She defines a joint commitment as one where multiple parties consciously and jointly enter into a specific state as a result of an agreement process.¹⁵¹ Unlike individual or personal commitments, Gilbert argues that joint commitments are a collaborative endeavour; two or more parties co-create the commitment and no individual is independently responsible for any given aspect of it.¹⁵² This extends to the rescinding of a joint commitment as well.¹⁵³

A joint commitment represents a collaborative intent to perform a particular action or achieve a particular goal as a united body.¹⁵⁴ All involved parties must express a readiness to undertake such a commitment together.¹⁵⁵ Gilbert argues that this is not

¹⁵⁰ Secretariat on Responsible Conduct of Research (Canada) et al., 2.

¹⁵¹ Margaret Gilbert, *Rights and Demands: A Foundational Inquiry*, *Rights and Demands* (Oxford University Press, 2018), 161, <https://www-oxfordscholarship-com.libaccess.lib.mcmaster.ca/view/10.1093/oso/9780198813767.001.0001/oso-9780198813767>.

¹⁵² Gilbert, 164.

¹⁵³ Gilbert, 165.

¹⁵⁴ Gilbert, 165.

¹⁵⁵ Gilbert, 167.

limited to a single form; parties can enter a joint commitment through a question and affirmative response, an open call for responses, and other scenarios that culminate in multiple parties affirming an intent to carry out a particular action, broadly construed. Gilbert argues that parties have the grounds to make demands of one another in order to maintain the status of a joint commitment, and centres accountability as a key component of these commitments. Every party must be held accountable to every other party involved in a joint commitment.¹⁵⁶

I want to argue that the interactions between Experiment, researchers seeking financial support, and donors to crowdfunding campaigns are all parties involved in a joint commitment where the product of that commitment is the development or publishing of new research. The following example is given in Gilbert’s account:

“Jack says to Jill “Shall we get some water?” expressing his readiness jointly to commit with her to accepting as a body the goal of getting some water. Jill replies “Sure!” thus expressing her readiness to do likewise. That these expressions have been made is common knowledge between Jill and Jack. Once Jill has made her reply, the two are jointly committed accordingly, as both understand.”¹⁵⁷

In the case of crowdfunding research, a similar format can be applied. When Prof. Jane Doe approaches Experiment with her research project idea, she is implicitly asking: “Do you trust me and the research I hope to produce?” If Experiment, as a corporate entity, responds to this initial action by approving Prof. Doe’s research proposal and posting it on their website, it has implicitly and affirmatively answered Prof. Doe’s

¹⁵⁶ Gilbert, 170.

¹⁵⁷ Gilbert, 168.

question. Thus, Experiment has entered into a joint commitment to produce new research in Prof. Doe’s area of study. Moreover, Experiment has demonstrated that Prof. Doe can be trusted by donors, who at this point enter the scenario. By choosing to support Prof. Doe’s project proposal, they too are implicitly agreeing with the decision made by Experiment to approve Prof. Doe’s project. They trust her ability to produce work, and they have affirmed their interest in her area of study. This tripartite commitment is comprised of three components. Prof. Doe has confirmed a particular research question or study, with specific budgetary requirements in mind. Experiment has approved that proposal, and donors contribute to a campaign based on the information contained within it. Each party is accountable to every other party, and there is no way for their agreement to survive without the ongoing assent and participation of Prof. Doe, Experiment, and donors who support Prof. Doe through her Experiment funding page. Trust is a vital connection made between every party involved in crowdfunded research, and it must be understood as such.

Onora O’Neill has written on the connection between trust and accountability on several occasions over the past two decades. In a 2018 paper on trust and trustworthiness, O’Neill explains that trust can be a valuable tool when placed in people, groups, or institutions worthy of that trust, but that it can also be damaging to trusting individuals if their trust is misplaced in untrustworthy groups.¹⁵⁸ O’Neill is especially troubled by the eroding of traditional gatekeepers in the digital landscape, where it may be more difficult

¹⁵⁸ Onora O’Neill, “Linking Trust to Trustworthiness,” *International Journal of Philosophical Studies* 26, no. 2 (March 15, 2018): 293, <https://doi.org/10.1080/09672559.2018.1454637>.

for individuals to discern whether their trust is well or misplaced.¹⁵⁹ In her more recent 2020 paper on digital media, trust, and accountability, O’Neill explores the nuances and changes in how we trust, trustworthiness, and accountability in the 21st century. O’Neill argues that as media and journals increasingly move online and the once clearly-defined roles of editors, writers, and publishers follow, the “old intermediaries,” especially the printed word, are no longer as relevant as they once were.¹⁶⁰ This means that consumers (from crowdfunding contributors to nutritional supplement buyers) may have a more difficult time discerning honest claims from fraudulent ones, and this has made the act of placing trust in people and institutions more complicated.¹⁶¹ New intermediaries have replaced the old, including bloggers and social media influencers, data analysts, and other new-age experts whose authority is not as entrenched in formal credentials as old intermediaries.¹⁶² The sacrifice digital media requires as a medium for asking and giving trust is reliable reporting and democratic debate.¹⁶³ Digital platforms allow for content creators to maintain a degree of anonymity in their posting, and this combined with the various ways that content can be presented or promoted to an audience can obfuscate the intent of that content.¹⁶⁴ O’Neill then asks how online communication can be held accountable to and by their audience, and how trustworthiness and accountability can be fostered in the digital space.¹⁶⁵ While O’Neill suggests the possibility of new regulatory

¹⁵⁹ O’Neill, 297.

¹⁶⁰ O’Neill, “Trust and Accountability in a Digital Age,” 6–7.

¹⁶¹ O’Neill, 7.

¹⁶² O’Neill, 13–14.

¹⁶³ O’Neill, 15.

¹⁶⁴ O’Neill, 16.

¹⁶⁵ O’Neill, 10.

frameworks for digital content, she concludes that in the case of digital content, this will be a difficult — if not impossible — feat to accomplish.¹⁶⁶

Much of this language and discussion can be related back to Mertonian norms and using a combination of Merton’s ethos of science and O’Neill’s concern about the future of trustworthy media, it becomes clear that crowdfunding for research cannot continue in the vein in which it currently exists. Anyone is able to create a project on a crowdfunding platform. On a site such as Experiment, a high school student’s project is presented beside a doctoral student’s work. In doing so, Experiment has effectively argued that both these projects are inherently equal in terms of professionalism, feasibility of completion, and general fundability, which makes it difficult for a contributor to place trust in a researcher in a fully informed manner.

Based on this, I could create a project on the platform and describe myself as a doctoral student in a field in which I do not work, for example, paleontology.¹⁶⁷ I can use my genuine appreciation for the field to inform an autobiography for the site, painting myself as a young, eager paleontologist either in academia or an outside organization. Putting aside any ill intent I may have (e.g. misuse of funding should I receive it), am I a trustworthy “paleontologist” in this example? I should say not. If I were to pursue a project of this sort, I would be in violation of the Mertonian norm of communism, as I would be masquerading as a member of a research community to which I do not belong.

¹⁶⁶ O’Neill, 17.

¹⁶⁷ I should note that anyone is able to create a project on Experiment. I could try the aforementioned prank project without claiming to be a doctoral student at all, just an interested citizen. However, for the purposes of streamlining my arguments and creating a point of comparison between traditionally-funded and crowdfunded researchers, I am focusing on the experience of using a crowdfunding platform as a person affiliated with academia.

And by acting in secrecy, I would not only violate this norm but also prove myself to not be a trustworthy individual, as O’Neill describes.¹⁶⁸ Regardless of my intent, I would be lying to my audience about my qualifications, and given the lack of a checking mechanism to confirm my credentials, there is no higher authority for Experiment or contributors to my crowdfunding campaign to hold me accountable to the project. It is worth noting that Experiment’s staff conduct interviews with any researchers whose projects have passed through initial assessment, and my credentials and ability to undertake this project would likely be questioned.¹⁶⁹ However there is no mandate that researchers have an academic background or specific credential in the field in which they hope to launch a campaign.¹⁷⁰

Additionally, as discussed in the previous chapter, there are few requirements in terms of providing backers with project updates. It is likely not worth my while to falsify everything about myself and my project in order to secure funding, and Experiment has a series of recommendations regarding information that may influence my project’s being accepted for funding and its ability to reach my funding goal, but it would appear as though there is no strict structure Experiment employs to ensure that every campaign on their site is in fact equally trustworthy. In turn, if that is the case, O’Neill’s concerns about how we separate trustworthy individuals from untrustworthy ones in an online setting are especially important, as we cannot guarantee that every person interacting with the platform has the same ability to differentiate between a trustworthy and less or

¹⁶⁸ O’Neill, “Linking Trust to Trustworthiness.”

¹⁶⁹ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

¹⁷⁰ “Frequently Asked Questions.”

untrustworthy campaign. Furthermore, if there is no standard for guaranteeing trustworthiness in a digital setting such as Experiment, what are backers using to decide which project proposals they find most trustworthy?

The general advice for researchers aiming to use a site like Experiment is to make use of personal networks such as friends and family because there is already presumably a trusting relationship that was built outside the context of a financial transaction.

Vachelard et al. reinforce the importance of trust several times in their crowdfunding guide for scientists. The authors recommend developing a core set of supporters who will allow researchers to display that others trust them.¹⁷¹ They also stress that precision in describing the use of funds will also demonstrate trustworthiness.¹⁷² These are both valid pieces of advice to give researchers, but I would counter that with decent writing skills it would certainly be possible to fool less research-savvy donors into supporting a less trustworthy project. Moreover, the assumptions that researchers are able to draw on support from their personal networks and that they have the necessary knowledge translation skills to entice strangers to donate to their campaign can create another issue in the crowdfunding space, one of equity. I will elaborate on this point in the following chapter, but for now it is worth noting that researchers are often asked to build upon or develop new skills in order to succeed on a crowdfunding platform with little support to do so.¹⁷³

¹⁷¹ Vachelard et al., “A Guide to Scientific Crowdfunding,” 3.

¹⁷² Vachelard et al., 5.

¹⁷³ Hui and Gerber, “Crowdfunding Science,” 36.

What is a researcher to do? There are complications in building a trustworthy campaign and online persona as a researcher, and many considerations of what is an attractive project that governing bodies and donors alike will feel they can trust. How can crowdfunding platforms facilitate an environment in which donors can hold researchers accountable to their research goals and use of funding? A tripartite joint commitment between researchers, donors, and a crowdfunding platform in this context represents an agreement, but it is not necessarily a mandate for how each party, especially the researcher, ought to act.

In the following section I will present an argument that if platforms like Experiment and the researchers who use them make an effort to act in a transparent manner, new opportunities for trust can be developed.

2.5 Seeing clearly: the importance of transparency in crowdfunded research

Most crowdfunding platforms, whether for research, product innovation, or urgent charitable action give users the option to post updates about their campaign even after a project has successfully met its goal. Experiment is no exception on this front. The platform encourages researchers to post consistent “Lab Notes” as a way to entice people to donate during the funding campaign and to keep donors updated on any progress or stumbling blocks they encounter after they have secured funding.¹⁷⁴ Experiment’s guide for researchers suggests one or two Lab Notes per week during the funding campaign, with a reduction to once a week once funding has been secured.¹⁷⁵ Experiment asks for

¹⁷⁴ “Researcher Guide - Share,” Experiment - Moving Science Forward, accessed March 3, 2020, <https://experiment.com/guide/share>.

¹⁷⁵ “Researcher Guide - Share.”

one to three project updates on a project page’s Lab Notes to keep contributors updated on how funding is being used, but according to a representative of the platform, there is currently no method in place to follow up with researchers or ensure that these notes are posted.¹⁷⁶ The goal of these updates is seemingly to create a mechanism of accountability, or as O’Neill puts it, a “new intermediary” to gatekeep the information being distributed by the researchers on their page, but the result is an unregulated framework that is not currently implemented evenly on the platform, and a shortcoming of the crowdfunding model that jeopardizes the trust necessary to facilitate a tripartite joint commitment between researchers, Experiment, and donors.

Presumably, researchers who use platforms like Experiment are either (a) inherently excited about the use of crowdfunding to support their research or (b) somewhat reluctant to use crowdfunding but eager to secure financial support. I am making the assumption that an insignificant number of researchers are openly hostile to the idea of open-access research and crowdfunding given that there are enough skills and tasks associated with crowdfunding that if a researcher did not fall into (a) they would by necessity have to fall into (b) if only due to the amount of work required to launch and sustain a crowdfunding campaign. Despite Experiment’s encouragement that researchers update their audience at least once a week, researchers squarely in the (b) camp may be less enthusiastic about the prospect of writing Lab Notes. Supposing our Prof. Doe is among those less enthusiastic about the use of crowdfunding, what would encourage her to take some of her time each week writing an update about her project for her

¹⁷⁶ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

supporters? Donations through Experiment are non-refundable, which means they cannot be returned once payment has been processed.¹⁷⁷ This means that if a researcher's project is successfully funded, the status of their funding is not contingent on their continued interaction with their donors. While Gilbert's theory of joint commitment can be used to demonstrate the ideal form of the relationship between crowdfunding platforms, researchers, and the public under ideal use of Experiment or a related platform, reality may not always reflect this theoretical ideal. A scan of the funded projects tab on Experiment illustrates this, notably because there is tremendous variety in the number of Lab Notes published by each project's research team. Some projects that received thousands of dollars and received over 100 percent of their funding goal have only posted a singular Lab Note, often one that predates the project receiving its funding.¹⁷⁸ Others, however, have posted over 10 notes, aligning much more closely with the suggestion made by Experiment.¹⁷⁹ Although the site recommends a certain course of action for researchers, suggestion is not mandate, nor are Lab Notes a necessary component of the joint commitment made between researchers, donors, and Experiment.

If Experiment were to enforce more stringent policies regarding transparency, accountability, and openness of communication, they could steer their users back towards the Mertonian norms and methods of traditionally-funded research. Crowdfunded research presents an incredible opportunity to change the paradigm of what research can be, but it needs regulations of its own in order for that potential to become opportunity.

¹⁷⁷ "Frequently Asked Questions."

¹⁷⁸ "Crowdfunding Platform for Science Research," Experiment - Moving Science Forward, accessed March 5, 2020, https://experiment.com/discover?order=ending_soon.

¹⁷⁹ "Crowdfunding Platform for Science Research."

Through its public webpages and thorough record-keeping, the Tri-Council keep their agencies accountable to the public through their transparency. Experiment does not need to adhere to identical procedures; there are specific advantages to the different kinds of research Experiment is able to promote. I think it can be helpful to think of regulation as providing structure more than a set of rules that must be obeyed. A more explicit breakdown of the types of projects that get funded, along with measures put in place to ensure that researchers can be held fully accountable for the use of the money they raise and the research goals they have in mind.

Currently, there is some ambiguity on this front. Experiment allows for projects to be funded beyond 100 percent of a funding goal. In the event that this occurs, Experiment allows teams to add “stretch goals”, which are a common tool used on many crowdfunding platforms to allow those seeking funding to raise more money than the safe amount agreed upon at the beginning of the crowdfunding campaign. While Experiment operates on an all-or-nothing framework, once funding surpasses 100 percent of the funds requested, funding recipients keep anything extra that is raised.^{180,181} Researchers are obliged to include a budget breakdown of their project when they launch a campaign, but this appears to only pertain to the initial funding goal. Researchers whose campaigns

¹⁸⁰ “Researcher Guide - Extra.”

¹⁸¹ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

Mercury is in our fog, so what about our food?

By Peter S Weiss (Weiss-Penzias)
 Backed by Ann O'Rourke, Alan Penzias, DAvid Penzias, Carl Lamborg, Eva Gaynes, Anne Barras, Terry Beaubois, Hiroshi Okochi, Jeremy Weiss, Ann Aylwin, Wiewen Tjiasmanto, Jodi Ernsausa, Philip Johnston, Ashay Humane, Roberta Bloom, Terry Rein, William Hewett, Mark Brigham, Megan Metz, Claire Paul, Jessica Penzias, Eisse Atkins, Tyson Van, Cienna Rominger, Irene Alder, Dror Sinal, Dave Berlin, Joe Pallon, Jacob Burr Reddig, Noel Weiss, Clara Bang, Arlene Schenerman, Jacqueline Zepeda, Genevieve V. Weaver, DVM, MPH, Armando Ornelas, Aaron Gaynes, Wythe Marschall, and WEEMING



\$2,637
 Raised of \$2,000 Goal
131%
 Funded on 3/22/20
 Successfully Funded
 How does this work?

Figure 1 The top of Peter S. Weiss' Experiment project page.

surpass their funding goal do not need to publicly account for the extra money they receive.¹⁸² For example, **Figure 1** shows the total amount of money raised for Peter S. Weiss' project on mercury levels in food, while **Figure 2** shows the budgetary breakdown for the

project.¹⁸³ Note that although the project raised well over its \$2,000 goal, the additional \$637 is not accounted for in the spending breakdown. Without adequate transparency measures in place, there is no way for researchers to demonstrate their trustworthiness to the members of the public who have contributed to their campaign. While one can make the argument that once funding has been received, it is the researchers' to use, any major change in budget and project focus

would violate the standing joint commitment between the researchers and contributors, researchers and Experiment, and contributors and Experiment. If Experiment has not facilitated a way

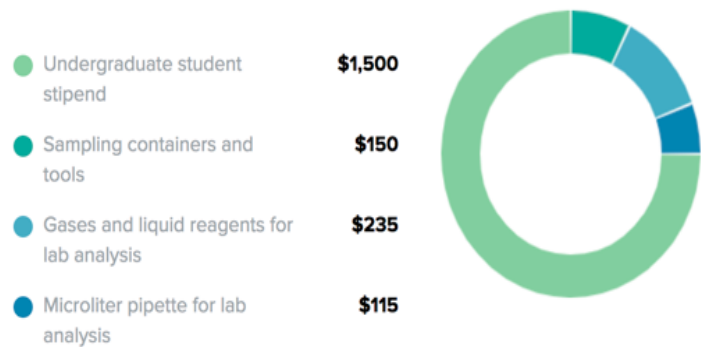


Figure 2 The budgetary breakdown of Weiss' project.

¹⁸² “Researcher Guide - Extra.”

¹⁸³ “Mercury Is in Our Fog, so What about Our Food?,” Experiment - Moving Science Forward, accessed July 18, 2020, <https://experiment.com/projects/mercury-is-in-our-fog-so-what-about-our-food>.

for researchers to account for budgetary changes or stretch goals in their budget, their system is neither transparent nor able to accommodate accountability, thus they have betrayed the trust of donors, who may use the fact that project proposals have been vetted by the platform’s staff as a sign that a given project is trustworthy. As O’Neill has argued, traditional (in this case academic) intermediaries are no longer relevant and their digital replacements are “harder to grasp” and cannot be disciplined or held accountable themselves.¹⁸⁴ As the party with the most organizational power in this arrangement, Experiment must facilitate a shift in accountability and transparency within its own platform. In doing so, Experiment will demonstrate its own good governance practices. According to the IoG, better governed organizations inspire trust in less powerful parties.¹⁸⁵ Experiment is currently in a state where taking initiative to become a more transparent, trustworthy, modern institution can transform it into a truly powerful tool for funding and endorsing future projects from younger researchers in particular.

2.6 Conclusion

The use of crowdfunding platforms such as Experiment has upset academia’s existing norms for funding research — and I have argued that this can be a tremendously positive change. Currently, however, crowdfunding in research is seen a largely unregulated environment where researchers have few rules to follow and contributors have even fewer reassurances.

¹⁸⁴ O’Neill, “Trust and Accountability in a Digital Age,” 8.

¹⁸⁵ Institute on Governance, “Rebuilding Cohesion and Trust: Why...,” text/html, Institute on Governance (Institute on Governance, July 15, 2020), <http://iog.ca/>, http://iog.ca/research-publications/rebuilding_cohesion_trust/.

A disruption of the longstanding norms of conducting research is not necessarily a misstep in the progress of research, however a disruption is not a complete elimination of norms. I have argued that through the building of trusting relationships and better governance and accountability measures, a new understanding of the ethos of research can be developed, potentially without discarding Mertonian norms. The general aim of funding facilitators has not changed; while motives may be different, both government agencies and crowdfunding platforms hope to fund the best research possible.^{186,187} Modern research in the 21st century looks drastically different than “modern research” undertaken by the Royal Society in the 17th century, but the goals have not changed. Researchers still collaborate and engage in dialogue to propel their respective fields into the future, and while much of the modern research process would seem alien to Francis Bacon, his dream for a society deeply engaged in their research is still very much alive today.

¹⁸⁶ Social Sciences and Humanities Research Council of Canada Government of Canada, “Social Sciences and Humanities Research Council: Our Mandate,” May 11, 2012, https://www.sshrc-crsh.gc.ca/about-au_sujet/mandate-mandat-eng.aspx.

¹⁸⁷ “Frequently Asked Questions.”

Chapter 3: The broadening and democratization of research

3.1 Introduction: inclusion, exclusion, and democratization in research

In my previous chapter, I discussed what I believe are three of the most pressing issues relevant to the ethical conduct of crowdfunding platforms used for research projects. These issues of governance, trust and accountability, and transparency are central to not only to issues of ethical importance but also those of equity. In this chapter, I will explore the latter, examining some of the implications poor governance and a lack of trust or accountability can have on researchers, which can affect factors such as who is able to participate in crowdfunded research, and who is not.

Inclusion and exclusion are ever-relevant actions in the pursuit of knowledge. Whose voices are taken seriously in research? What problems are brought to the fore of discussion and debate? Moreover, whose voices, approaches, and focus areas are dismissed, and on what grounds? Historically, from the proposal of a research institution such as Salomon's House in Francis Bacon's *Nova Atlantis*, the intent of research groups has been to distinguish themselves from the public.¹⁸⁸ There are certainly reasons to defend the separation between an institution and the public, but in this chapter I want to argue that these separation efforts have led to a stratification within the general pool of individuals interested in conducting research. As a result, the range of people conducting research is still quite narrow, and this has affects what research gets produced.

In many ways, the possibility of using crowdfunding to finance research grants opportunities to individuals who may not otherwise have access to them. These

¹⁸⁸ Klein, "Francis Bacon."

opportunities are not without their own complications, however. In this chapter, I aim to enumerate a number of these complications in several areas of the crowdfunding relationship. I first explore the role of the public’s opinion in directly deciding what projects receive funding, examining the potential for this inclusion to skew the future of research areas. Who is able to contribute to crowdfunding campaigns, and who ultimately does? This question ties into my second area of focus: diversity in the use of crowdfunding. Many crowdfunding platforms — including Experiment, the largest platform for crowdfunding research projects — tout that anyone with a strong proposal can achieve success with their platform.¹⁸⁹ I want to press on this claim though and argue that many researchers’ ideas and goals still cannot find a voice on crowdfunding platforms. Researchers in resource-poor areas, or with weak Internet connections, or whose personal networks are unable to back their crowdfunding campaigns will still encounter insurmountable barriers to entry for conducting research, even with this open approach to funding. I am also concerned with the credibility and accessibility of crowdfunding platforms for funding research projects. While there is no way to divine the future of crowdfunding — nor of research — by merely observing the present,¹⁹⁰ I am concerned with how the increasingly widespread use of crowdfunding platforms may shape the future of research fields and what constitutes “research” in the first place. These concerns have far-reaching effects for elementary school students, researchers, and ethicists alike, and if crowdfunding is to become a more relied-upon resource, these

¹⁸⁹ “Frequently Asked Questions.”

¹⁹⁰ For example, how could the majority of us have predicted the COVID-19 pandemic at the end of 2019?

concerns, if not quelled, must at least be considered carefully. These complications are preceded by a brief historical overview of the demographics of those involved, or allowed to be involved, in research. This will allow for a more complete understanding of the issues I explore and will and contextualize the past and current setbacks in the democratization of research and the involvement of historically underrepresented groups in research.

3.2 A new hierarchy: The Royal Society and elitism in the history of research

Much like the previous chapter, I wish to begin this chapter with a history lesson. This context regarding the involvement of “historically underrepresented groups” in research serves as a reminder that many of the issues I am exploring in this project are centuries old. While some of the specifics have changed, the blueprints for change already exist in the history of science. The inclusion of researchers in resource-poor areas in crowdfunding platforms is a novel idea; the inclusion of researchers who do not wield institutional power is not, as I will demonstrate through the pugnacious history of the inclusion of women in learned societies and as legitimate researchers as worthy of supporting as their male counterparts.

When the Royal Society of London was founded in 1660, it quickly became the place for accomplished men of science, or natural philosophy, to gather and discuss experiments and theories about the natural world. The society enabled the funding of its Fellows’ expensive voyages and experiments and provided members with an environment that resembled Bacon’s dream of Salomon’s House, where researchers could spend their

time studying various aspects of the earth and life upon it.^{191,192} The original Fellows were some of the most accomplished scientists in England, and most came from wealth. Fellows were described as well educated, with ample resources at their disposal and the “usual generosity of noble blood.”¹⁹³ The earliest Fellows were granted membership based on interest in natural philosophy; they need not have been leaders in their field of study, nor were they expected to remain Fellows for their entire life.¹⁹⁴ Today, a Fellowship is an honour bestowed upon scientists who are paragons of achievement in their field, and their affiliation with the Royal Society typically endures for the rest of their lives.¹⁹⁵ Nevertheless, early members were still part of an exclusive club. When scanning the names and biographies of the Society’s first members, lords, barons, and earls comprised a large proportion of early membership.¹⁹⁶ An early ruling decreed that nobles including and above the rank of baron were to be granted membership “without scrutiny,” a privilege later extended to other officials and the sons of members.¹⁹⁷ The environment within the Society and its affiliated publication *Philosophical Transactions* was described as “gentlemanly,”¹⁹⁸ and the formation of the Society sparked great interest in the study of science amongst the noble classes.¹⁹⁹

¹⁹¹ “History of the Royal Society | Royal Society.”

¹⁹² Bacon, *Bacon’s Advancement of Learning and The New Atlantis*, 255.

¹⁹³ F H A Marshall, “The Origin and Development of the Royal Society of London,” *The Dalhousie Review*, 1928, 409.

¹⁹⁴ E. S. De Beer, “The Earliest Fellows of the Royal Society,” *Notes and Records of the Royal Society of London* 7, no. 2 (April 1, 1950): 173, <https://doi.org/10.1098/rsnr.1950.0014>.

¹⁹⁵ “History of the Royal Society | Royal Society.”

¹⁹⁶ De Beer, “The Earliest Fellows of the Royal Society.”

¹⁹⁷ De Beer, 176.

¹⁹⁸ Aileen Fyfe and Camilla Mørk Røstvik, “How Female Fellows Fared at the Royal Society,” *Nature* 555, no. 7695 (March 2018): 159, <https://doi.org/10.1038/d41586-018-02746-z>.

¹⁹⁹ Marshall, “The Origin and Development of the Royal Society of London,” 406.

It becomes readily apparent that the Royal Society of 1660 was not a welcoming environment where anyone interested in natural philosopher could simply gather; it was a place for men of significant capital to exchange ideas and argue amongst themselves. As the Society became a more established body, there were pushes to diversify the socioeconomic class of Fellows. This was a goal Sir Humphrey Davy set out to achieve during his tenure as the President of the Royal Society having had to work to climb the social ranks from unknown origins.²⁰⁰ Biographers have remarked that Davy “undoubtedly aspired to the status of a gentleman scientist,” a position he was able to secure through a marriage into a wealthy family.²⁰¹ In his 1820 bid for the Presidency of the Royal Society, Davy argued that “the only dignity or office which can be the reward of important scientific labours ought not to be conferred on wealth and general talent or on mere rank.”²⁰² While Davy hoped to achieve balance and unite a growing and ever-dividing Royal Society, he was characterized as a weak political leader, and his tenure as President was marked with debate and fracture within the Society until his resignation in 1827.²⁰³ While Davy advocated for a more stringent selection of new Fellows based purely on scientific achievement, but developed no formal policy on the matter, and after efforts to constrain new members in the early 1820s, Fellowship numbers began to rise again.

²⁰⁰ David Philip Miller, “Between Hostile Camps: Sir Humphry Davy’s Presidency of the Royal Society of London, 1820-1827,” *The British Journal for the History of Science* 16, no. 1 (1983): 1.

²⁰¹ Miller, 22.

²⁰² Miller, 28.

²⁰³ Miller, 30.

In the 1840s, critics of the Royal Society’s nomination process cautioned against selecting candidates based on their being “well born, well dressed and moderately learned in science”.²⁰⁴ By 1847, the Society passed new documentation requiring that candidates for Fellowships be selected based on scientific merit and contributions to their fields rather than their status as wealthy members of society.²⁰⁵ The 1840s marked other changes for the Royal Society. In 1841 Ardaseer Cursetjee, India’s first modern engineer, joined the ranks of the Society’s Fellows.²⁰⁶ The Society would not nominate another Indian researcher until famed mathematician Ramanujan’s appointment in 1918, nearly 80 years after Cursetjee became a member of the Society.²⁰⁷ Although the Royal Society now puts forward a summary of diversity in their membership, this practice is relatively new and, even with a commitment to include minorities and marginalized groups, very few Fellows identify as anything other than heterosexual, white, British men.²⁰⁸

The Royal Society did not welcome women into its ranks until 1945, nearly 300 years after its founding.²⁰⁹ Over the first 20 years of the 20th century, multiple events occurred that challenged the Society’s long-maintained exclusion of women, but it would take calls for change on several levels before the first women Fellows would be announced. Interestingly, the Royal Society’s stance on women Fellows was somewhat atypical for the period. Other scientific societies, such as the Zoological Society of

²⁰⁴ Marshall, “The Origin and Development of the Royal Society of London,” 412. Marshall, “The Origin and Development of the Royal Society of London,” 412.

²⁰⁵ Marshall, 412.

²⁰⁶ Rajesh Kochhar, “Indian Fellows of the Royal Society, London (1841-2000),” *Current Science* 80, no. 6 (March 25, 2001): 721.

²⁰⁷ Kochhar, 721.

²⁰⁸ The Royal Society, “Diversity Data Report 2018” (The Royal Society, 2019).

²⁰⁹ “History of the Royal Society | Royal Society.”

London and the Royal Entomological Society allowed for women to join as full members from their foundations in 1829 and 1833, respectively.²¹⁰ Other societies followed suit in the early 20th century, and in 1919, the Sex Disqualification (Removal) Act was passed in England, which eliminated legal barriers preventing the appointment of women to societies and other bodies.²¹¹ This meant that universities and organizations such as the Royal Society could no longer apply clauses in their own charters that allowed for discrimination against women.²¹²

Hertha Ayrton was the first woman to be proposed for a Royal Society Fellowship.²¹³ An accomplished physicist, Ayrton was recommended as a candidate for the Royal Society in 1902.²¹⁴ Despite her accomplishments and a strong set of recommendations from the members proposing her candidacy, Ayrton was deemed ineligible for a Fellowship because of her status as a married woman; in the eyes of the law, it would be another 27 years before women were legally recognized as persons.²¹⁵ However, due to the passing of the Sex Disqualification (Removal) Act, Ayrton's application would have been accepted in 1920, were it not for the death of all but one of her sponsors between 1902 and 1920.²¹⁶

²¹⁰ Joan Mason, "The Admission of the First Women to the Royal Society of London," *Notes and Records of the Royal Society of London* 46, no. 2 (July 1, 1992): 294, <https://doi.org/10.1098/rsnr.1992.0027>.

²¹¹ Mason, 279.

²¹² Mason, "Hertha Ayrton (1854-1923) and the Admission of Women to the Royal Society of London," 213.

²¹³ Mason, 201.

²¹⁴ Mason, 207.

²¹⁵ Mason, 209.

²¹⁶ Mason, 213.

The first successful campaigns to induct a woman into the Royal Society were both mounted in 1943 in support of crystallographer Kathleen Lonsdale and biochemist Marjory Stephenson.²¹⁷ Both were ultimately inducted in the 1945 class of Fellows. Both Lonsdale and Stephenson's Fellowship nomination campaigns were spearheaded by men who championed the inclusion of women, most notably biologist J.B.S. Haldane.²¹⁸ Lonsdale and Stephenson also had family members who supported their research endeavours. Lonsdale credited her "ruthless" work ethic and the "sympathetic encouragement" of her husband as two of the major factors that enabled her to pursue her research to her fullest capabilities, while Stephenson's parents were adamant that she receive an education.²¹⁹ While I would argue that this kind of familial support is still necessary for many women in science, I would also argue that the nature of that support has changed somewhat, however that is not a topic I have the capacity to explore in this work.

Stephenson passed away just three years after being inducted into the Society, while Lonsdale continued working until she was on her deathbed in 1971, however both women contributed to their respective fields until their deaths. Both were involved in activist causes of their day — as was Ayrton, who developed a strong friendship with Marie Curie through work in the women's suffrage movement in England.²²⁰ Ayrton was a vocal suffragette who participated in the great march of 1911, and expressed pride when her daughter was arrested for involvement in the movement.²²¹ Ayrton moved a

²¹⁷ Mason, "The Admission of the First Women to the Royal Society of London."

²¹⁸ Mason, 288–90.

²¹⁹ Mason, 284.

²²⁰ Mason, "Hertha Ayrton (1854-1923) and the Admission of Women to the Royal Society of London," 211.

²²¹ Mason, 211.

presentation of a paper she was due to present to the Royal Society as she expected to be in prison for participation in the women's suffrage movement.²²² Stephenson was also a noted suffragist.²²³ Lonsdale was described as a “crusader” who pushed for prison reform, and the inclusion of women in science.²²⁴ She was also a pacifist who pushed the Royal Society to participate in the Pugwash movement in support of peaceful application of scientific advances.²²⁵ I include these biographical details because for each of these women, their accomplishments and commitment to the future of research went beyond their career work. Hertha Ayrton, Marjory Stephenson, and Kathleen Lonsdale were all committed in their own ways to improving living and working conditions for women in their time and beyond.

During the campaigns for Lonsdale and Stephenson's Fellowships, current Fellows were restrained in their support. Fellows such as physicist and molecular biologist William Astbury wrote coolly of women being permitted to join the Royal Society. In a letter, Astbury admitted that while Kathleen Lonsdale was the best woman scientist he knew of, she was in a category separate from male scientists, as he “still maintain[ed] that there is a creative spark in the male that is absent from women.”²²⁶ Even after women were permitted to become members of the Royal Society, they were subject to gendered title use, such as being referred to as “Miss” when they had doctorates.²²⁷ An

²²² Mason, 212.

²²³ Mason, “The Admission of the First Women to the Royal Society of London,” 286.

²²⁴ Mason, 283–84.

²²⁵ Mason, 284.

²²⁶ Mason, 290.

²²⁷ Fyfe and Røstvik, “How Female Fellows Fared at the Royal Society,” 161.

internal culture male Fellows deemed “gentlemanly” was seen as discriminatory to women in the Society and those who submitted papers to its network of journals.²²⁸

Today, the Royal Society publishes an annual diversity report, highlighting the age, gender, race, sexual orientation, and disability breakdown of their membership. Measures such as these are important to the accountability process; the Society is committed to increasing diversity within science-related disciplines and the publication of these reports demonstrates any progress or shortcomings in those efforts.²²⁹ Current statistics from the Society are far from encouraging. In 2018, only 9 percent of Fellows and Foreign Members identified as women, a grand total of 157 out of a group of 1,653 current Fellows and Foreign Members (or 136 out of 1,483 Fellows).²³⁰ For context, in 2017 women accounted for 24 percent of professors.²³¹ Furthermore, the Society’s members are still overwhelmingly white. While it should be noted that only 39 percent of current members responded to the ethnicity survey, the results skew so white that the report lists ethnicity as “white British,” which account for 75 percent of the current Fellows and Foreign Members, “white other,” which account for 20 percent, and “Black and minority ethnic,” which account for the remaining 5 percent of Fellows.²³²

These statistics and historical background provide essential context for the state of research today, because while the Royal Society of London is known in particular for its prestige, analogous organizations exist all over the world. Researchers working in other

²²⁸ Fyfe and Røstvik, 160.

²²⁹ The Royal Society, “Diversity Data Report 2018,” 4.

²³⁰ The Royal Society, 6.

²³¹ Fyfe and Røstvik, “How Female Fellows Fared at the Royal Society,” 161.

²³² The Royal Society, “Diversity Data Report 2018,” 9.

parts of the world face similar barriers to entering the research field. Furthermore, as has been feared and documented in a number of publications, the fallout from a catastrophic event (such as a pandemic) disproportionately affects women, racial minorities, and those from financially disadvantaged backgrounds working in research.²³³ Between the current state of the world due to the COVID-19 pandemic and dropping funding rates from old guard research institutes and other organizations drop, researchers turn to alternative avenues, such as crowdfunding, to support their research.²³⁴ Crowdfunding changes or eliminates many of the roles involved in more traditional funding models and gives the general public the opportunity to have a stake and a voice in the research that gets supported. While this presents no shortage of opportunity for both would-be funders and researchers, it also presents a number of ethical issues and provokes a number of philosophical questions. In my previous chapter, I focused on three ethical issues in crowdfunding related to governance, trust and accountability, and transparency. In the remainder of this chapter, I will keep these issues in mind while addressing three areas where crowdfunding is said to democratize research: the voicing of public opinion, diversity in the field, and the trade-offs between credibility and accessibility.

3.3 Democratization? In *my* funding process?

Before I dissect the three areas where the supposed democratization of research is present, I want to first provide some basis for why the claim that crowdfunding leads to a more democratic approach to research funding allocation. While the initial draw of

²³³ Chris Woolston, “‘It’s like We’re Going Back 30 Years’: How the Coronavirus Is Gutting Diversity in Science,” *Nature*, July 31, 2020, <https://doi.org/10.1038/d41586-020-02288-3>.

²³⁴ Wheat et al., “Raising Money for Scientific Research through Crowdfunding,” 71.

crowdfunding for the purpose of academic research was likely as a relatively straightforward solution to plummeting funding rates, the use of sites such as Experiment to at least partially fund projects has been hailed as a way to facilitate a new kind of relationship between researchers and the general public.²³⁵ In Wheat et al.'s paper on the use of crowdfunding in science, the authors express that “the true potential of crowdfunding lies not in raising funds for conducting research, but in the opportunities for public outreach and science education engendered by this type of funding model.”²³⁶ This line of argument is expanded upon in later works. While experts in a given field are well-placed to determine what research proposals are likely to generate value, those few individuals are likely not able to comment on what research will count as “successful knowledge” as this designation is based on the production of social value, or “what gets done” with the knowledge once it has been collected.²³⁷

More generally, there is a great deal of optimism that crowdfunding, both in academic research and in more general contexts, can be beneficial for individuals and communities in LMICs. A 2013 study from The World Bank promotes the use of crowdfunding in less affluent countries as a way to encourage efficient innovation and allow countries to “leapfrog” into the economic circumstances of an HIC.²³⁸ Taken together with the inclusion of public voice, academics and economists appear hopeful that

²³⁵ Wheat et al., 71–72.

²³⁶ Wheat et al., 72.

²³⁷ Lorenzo del Savio, “The Place of Crowdfunding in the Discovery of Scientific and Social Value of Medical Research,” *Bioethics* 31, no. 5 (2017): 387, <https://doi.org/10.1111/bioe.12339>.

²³⁸ The World Bank, “Crowdfunding’s Potential for the Developing World,” 9.

crowdfunding is an accessible way to drive research funding to ECRs and those working in parts of the world where funding is scarcer.^{239,240}

This idea is reinforced on crowdfunding platforms; for example, Experiment is adamant in its background information page that anyone can launch a new project on the site, although individuals who submit project proposals are subject to a thorough review from and interview with the company’s staff.^{241,242} While the platform’s staff will likely have questions for members of the general public who wish to use Experiment to fund a research project, they will not reject an application simply because the investigator is not a researcher by training.²⁴³ Based on the inclusive language Experiment uses to encourage new projects and the encouragement present in the literature, it is reasonable to suggest that the consensus about crowdfunding is that it is a funding opportunity that can diversify who gets to conduct research and what kind of research gets done. Having now established a reasonable basis for the existence of this line of thinking, I want to interrogate the truth of the claim that crowdfunding has made the research world more diverse and accessible.

3.4 Throwing money at a (research) problem

As I have described in earlier sections of this thesis, mainly in my first chapter, crowdfunding gives the general public a direct voice in the determination of which projects receive funding. The presence of an audience that can provide financial support

²³⁹ Hui and Gerber, “Crowdfunding Science,” 31.

²⁴⁰ Vachelard et al., “A Guide to Scientific Crowdfunding,” 3.

²⁴¹ “How It Works,” Experiment - Moving Science Forward, accessed August 11, 2020, <https://experiment.com/how-it-works>.

²⁴² Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

²⁴³ Sharpe.

can affect research project proposals that are submitted, along with the proposals that get funded. Researchers who use crowdfunding are encouraged to use accessible language and convey passion for their work to encourage potential donors to support their campaign.²⁴⁴ In their guide to scientific crowdfunding, Vachelard et al. remind researchers that their project proposals are competing for attention with lighter, more humorous, and more accessible content that is likely the main focus for most people who have not explicitly sought out a specific project.²⁴⁵

Who ultimately contributes to crowdfunding campaigns for research projects? Experiment does not allow for rewards or perks, factors that may entice donations on more entrepreneurially-oriented crowdfunding sites, so contributors likely have some other reason for their donation. In most cases, donors have contributed to a project because they either personally know or are in the social network of the research team. According to Experiment's staff, who clarified this further, as many as 70 percent of contributors to a project are friends or family members of a team member, or they are connected with a team member on a social networking platform such as Twitter or Facebook.²⁴⁶ The remaining 30 percent come from a combination of strangers, second-degree connections (e.g. social media connections or "friends of friends" or followers), and Experiment regulars — a small but present group of individuals who make regular contributions to new projects that are posted on the Experiment platform.²⁴⁷ In short, this means that researchers must depend on extant personal networks to support their

²⁴⁴ Vachelard et al., "A Guide to Scientific Crowdfunding," 3–4.

²⁴⁵ Vachelard et al., 4.

²⁴⁶ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

²⁴⁷ Sharpe.

crowdfunding campaigns, either through in-person or virtual networking. This statistic is further reinforced in Vachelard et al.'s guide, which recommends that researchers hoping to achieve their funding goals “mobilize all [their] connections before launching the project on a crowdfunding platform,” and that individuals or teams with weaker social networks spend time developing these relationships before launching a campaign.²⁴⁸

While it appears that the majority of a given project's funding will stem from a direct personal connection between the research team and a donor, most scientific crowdfunding platforms — Experiment included — operate on an “all-or-nothing” basis, meaning that projects that raise between one and 99 percent of their goal will not receive any money, so while I have concerns about how some researchers reach that supposed 70 percent of their pledges, I am more interested in the 30 percent of pledges from indirect sources. They account for almost a third of a given fundraiser's goal, and that marks the difference between a project going forward or having to stagnate or stop due to lack of funds.

The issue I see related to that large 70 percent of funds from direct connections is related to the power and capital (both monetary and social) of those in a researcher's direct network. Let us return to our example of Prof. Doe, a young PI at the University of Hypotheticals. She is an accomplished and well-published academic with a doctorate from a university with a strong commitment to mentoring current graduate students and encouraging them to use the institution's thriving alumni association to connect with past students who have attained success in their own fields. If Prof. Doe comes from a middle or upper-class family, she likely spent the years of her doctorate networking with these

²⁴⁸ Vachelard et al., “A Guide to Scientific Crowdfunding,” 3.

individuals, adding them on Facebook, becoming mutuals on Twitter and LinkedIn, along with other, more discipline-specific platforms.²⁴⁹ If, however, Prof. Doe was unfamiliar with how graduate-school networking operates, came from a less affluent family, worked too many part-time jobs to submit to conferences or engage in unpaid professionalization opportunities, or attended a PhD program with a poor mentorship program, her network, no matter the effort she put into it, would likely suffer.

What could this mean for Prof. Doe when she wishes to launch a crowdfunding campaign for her latest project at the U of H? If she had the opportunities presented in the first scenario, Prof. Doe would likely have an easier time gaining the 70 percent of her pledges that are predicted to come from family, friends, and other immediate connections. A study on crowdfunding success has illustrated that outreach efforts, such as encouraging individuals in one's social network to "like" and "share" project pages has a positive affect on funding outcomes.²⁵⁰ If the latter scenario I presented above is the case, Prof. Doe will likely have a more difficult time garnering support for her campaign, as she will not have enough pre-existing relationships to draw on for financial support. If her family and friends largely belong to a socioeconomic class where they are less likely to have disposable income or be able to afford donations to causes, organizations, and crowdfunding campaigns. Experiment does not aggregate more detailed data about who

²⁴⁹ The term "mutuals" is common Internet shorthand for the relationship between two users on a platform such as Twitter, where Person A and Person B each follow the other. My following a well-known professor on Twitter and them following me back is an example of mutual following. My decision to follow the official Air Bud account and the golden retriever's astute decision to not return the favour means we are not mutuals.

²⁵⁰ Jarrett E. K. Byrnes et al., "To Crowdfund Research, Scientists Must Build an Audience for Their Work," *PLOS ONE* 9, no. 12 (December 10, 2014): 12, <https://doi.org/10.1371/journal.pone.0110329>.

contributes to campaigns on their site, but it seems reasonable to assume that the 70 percent who contribute to a campaign because they know the researcher(s) who launched it are *unlikely* to contribute to other campaigns where they do not have a personal connection to the team raising funds. This in turn implies that the vast majority of contributors to a campaign do so for social-related reasons rather than interest in the research, though that may also be the case. What this means for Prof. Doe in the latter case is that she will have to rely more on individuals outside of her personal network, a population which would likely only account for about 30 percent of her fundraising goal. The disadvantages Prof. Doe would have already experienced in this latter case are further exacerbated by the conditions under which she would launch a crowdfunding campaign. For all the discussion around the ways that crowdfunding “levels the playing field” of research funding proposals for ECRs and women,²⁵¹ there are clearly still a number of barriers still in place for many scholars. This is also true for researchers in LMICs. If a researcher is unable to maintain Internet connectivity to complete all the online steps required to set up a project on Experiment, they will not be able to engage with donors, share their project page with their social networks (or they may not have robust digital social networks at all).

There are other concerns about who contributes to crowdfunding research projects more generally, namely what may happen to the course of research if the public has a growing and direct voice in the decisions of which projects receive funding. If

²⁵¹ Chiara Franzoni, Henry Sauermann, and Kourosh Shafi, “Crowdfunding Money for Research Levels the Playing Field,” *VoxEU.Org* (blog), February 14, 2019, <https://voxeu.org/article/crowdfunding-money-research-levels-playing-field>.

Experiment and related platforms continue to grow so that a larger proportion of research proposals are launched as crowdfunding campaigns than the current numbers, the public's growing direct engagement with project proposals may skew the kind of research that receives support, in turn steering certain fields towards furthering the investigation of specific kinds of research questions. This steering already exists in the traditional research funding model. The Tri-Council of Canadian research associations puts out calls for proposals in particular areas. For example, when the World Health Organization declared the COVID-19 outbreak to be a pandemic, the Tri-Council announced a limited-time funding opportunity for researchers with projects related to the study of the novel coronavirus.²⁵² Many proponents of the implementation of crowdfunding as a legitimate alternative to traditional grant-based funding cite the benefits that come from public engagement in research, but they have failed to consider two problems: once given this more direct power over what projects get funded, will people balk at the notion of funding government research grants for projects they themselves did not have a hand in choosing? And what if the public is adamant about funding a project (or more likely, projects across a number of fields) that, while sufficiently rigorous to pass through the submission and interview process Experiment uses to vet projects, ultimately contributes very little to the development of the field?

Questions of authority and autonomy are often difficult to answer. While there is certainly merit to the critique that the general population may have a difficult time parsing

²⁵² Government of Canada, "Social Sciences and Humanities Research Council: Funding Search Tool."

through the aims, techniques, and hypotheses of a proposal,²⁵³ the same could likely be said of proposals that go through the Tri-Council application process. For instance, proposals for SSHRC doctoral fellowships are grouped based on subject matter, but within each group one encounters a tremendous variety of subjects and project ideas.²⁵⁴ Philosophy projects are streamed into the same pool as projects from classics departments, meaning that while there are likely to be a few members of a SSHRC committee that are familiar with the material in a classics scholar's proposal on the importance of a particular architectural development, it is also likely that some committee members who will not see the same value in the proposal. This is, of course, not the sole determinant of funding allocation, but it does undermine the counterargument that anyone who is on a traditional funding allocation-related committee is equally informed on every project that may find its way into the proposal pile. Advocates of the crowdfunding model may argue that this new method allows the public to select which projects they are interested in funding, and that their interest — but not formal authority on a subject — is no different than a SSHRC committee member's personal interest (or lack thereof) in a project outside of their particular area of study.

Another concern is that of what projects and proposals draw the most audience members in, especially in the 30 percent of donors who do not know the research team.

²⁵³ Henry Sauermann, Chiara Franzoni, and Kouros Shafi, "Crowdfunding Scientific Research: Descriptive Insights and Correlates of Funding Success," ed. Frank J van Rijnsvoever, *PLOS ONE* 14, no. 1 (January 4, 2019): 2, <https://doi.org/10.1371/journal.pone.0208384>.

²⁵⁴ Social Sciences and Humanities Research Council Government of Canada, "Social Sciences and Humanities Research Council: Doctoral Awards Selection Committees," May 11, 2012, https://www.sshrc-crsh.gc.ca/funding-financement/apply-demande/background-renseignements/doctoral_committees-comites_doctorat-eng.aspx.

What kinds of projects attract that final group of donors? I propose a hypothetical scenario. Suppose Prof. Doe (having had the opportunities laid out in the first case above) has launched a wildly successful crowdfunding campaign about a novel treatment for West Nile virus. She has reached 75 percent of her goal by engaging with friends and family, colleagues at the University of Hypotheticals, and other professional acquaintances by talking about her project and the campaign and sharing Facebook and Twitter accounts dedicated to the project. It so happens that West Nile virus is in the news at the time, and because her project is mentioned in an article about the virus, and her colleagues share Prof. Doe's campaign page with other colleagues and adjacent fields, the project reaches and surpasses its funding goal. At the same time, a different scientist, Prof. Fish, has launched a campaign to map the spread of a coronavirus outbreak in a country far away from her own institution, Ahead of the Curve University, in the same country as the U of H. While her colleagues recognize the importance of her work, and her friends and family are supportive as well, the virus is not in the news cycle where Prof. Fish is working as it does not pose a threat, nor is it an engaging story from a breaking news perspective. Prof. Fish reaches 67 percent of her funding goal, but having not reached the total goal, the pledges are returned to the donors, and Prof. Fish is forced to shut down or alter her project. A month after their respective campaigns end, the coronavirus Prof. Fish was hoping to track has spread to their country. Businesses are shut down, schools close, and Prof. Doe's project is forced to shutter when the U of H closes its campus and labs. It is unlikely that her project will be able to resume in a timely manner, and by the time she and her team can return to the lab, their samples will no

longer be viable. Steered by good branding, an engaging proposal, and the influence of other researchers and connections,^{255,256} those who contributed to Prof. Doe’s campaign would have better allocated their donation had they contributed to Prof. Fish’s campaign, which they had likely never heard about.

This example, while a simplification of the vast array of fundable projects on crowdfunding sites raises questions about personal responsibility, scientific literacy, and responsible media coverage. Combined with the other questions of formal or academic authority mentioned above, in its current state crowdfunding does not seem to clear a number of the issues with traditional grant funding as well as its proponents argue it does.

3.5 Diversity and accessibility in crowdfunded research

As has been mentioned in both the literature and in previous sections of this thesis, crowdfunding is purported to encourage diversity in research, especially for women and ECRs.^{257,258} Other than some baseline expectations in terms of qualifications, there are few surface-level criteria researchers must fulfill on Experiment, and while a proven track record or degree in an area of study may help bolster a contributor’s confidence in a particular campaign, Experiment does not set a hard rule about formal education requirements.²⁵⁹ Experiment is marketed as an invitation for anyone to pursue a research project, and although the platform does not record demographic data about who launches campaigns on the site, other studies of the data from Experiment and similar

²⁵⁵ Hui and Gerber, “Crowdfunding Science,” 33.

²⁵⁶ Vachelard et al., “A Guide to Scientific Crowdfunding,” 3.

²⁵⁷ Hui and Gerber, “Crowdfunding Science,” 40.

²⁵⁸ Vachelard et al., “A Guide to Scientific Crowdfunding,” 1.

²⁵⁹ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

research-focused crowdfunding sites have found that a large percentage of projects listed are run by students or earlier-career academics.²⁶⁰ According to one study, students (ranging from undergraduate to graduate to those in medical school) and postdoctorate researchers are responsible for authoring almost three quarters of the projects on Experiment.²⁶¹ The same study found that across all the various funding subjects, 40 percent of campaign creators are women.²⁶² Other studies that have focused on broader trends in crowdfunding (i.e. entrepreneurial crowdfunding), women have a higher success rate on crowdfunding platforms.^{263,264} Women are especially more likely to have success using crowdfunding in sectors where women are underrepresented.²⁶⁵ As one study from 2017 determined, this is likely due to activist choice homophily, a concept used to describe an attraction to (or in this case support of) another individual is based in part on similarity, but also on “perceptions of shared structural barriers stemming from a common social identity based on group membership.”²⁶⁶ This means that, for example, it is more likely that women will be interested in supporting Prof. Doe’s campaign than a male colleague’s not just because they want to support other women, but because they understand the issue of representation in the field and want to help an individual who shares the same social category as them (i.e. “woman”) to overcome structural barriers.²⁶⁷

²⁶⁰ Sauermann, Franzoni, and Shafi, “Crowdfunding Scientific Research.”

²⁶¹ Sauermann, Franzoni, and Shafi, 10.

²⁶² Sauermann, Franzoni, and Shafi, 10.

²⁶³ Sauermann, Franzoni, and Shafi, 3.

²⁶⁴ Jason Greenberg and Ethan Mollick, “Activist Choice Homophily and the Crowdfunding of Female Founders,” *Administrative Science Quarterly* 62, no. 2 (June 1, 2017): 367, <https://doi.org/10.1177/0001839216678847>.

²⁶⁵ Greenberg and Mollick, 365.

²⁶⁶ Greenberg and Mollick, 341.

²⁶⁷ Greenberg and Mollick, 365.

While efforts to increase the number of women and ECRs using and having success with crowdfunding is a valuable step in the broadening of who is able to do research, these efforts are not a panacea. There are other groups that still face tremendous structural barriers to their involvement in research, especially for researchers from poorer backgrounds and those working in LMICs.

Issues related to resource scarcity that may prevent the use of crowdfunding are apparent in LMICs. The World Bank has touted crowdfunding as a tool with great potential for less affluent regions,²⁶⁸ and proponents of the use of crowdfunding in academic research settings have reiterated this point,²⁶⁹ but there are serious infrastructural, economic, and social shortcomings that have yet to be addressed in a useful enough way to make crowdfunding a viable option for researchers in LMICs.

The most obvious of these shortcomings are those tied to infrastructure and economics. According to the data collected in the World Bank's 2013 report on crowdfunding, it was estimated that 40 percent of people in Africa would have access to a smartphone by 2018.²⁷⁰ That still leaves over half of the population of a continent without access to a phone and, presumably, the Internet. In a 2018 study on the concerns researchers in LMICs had related to data sharing, between 52 and 63 percent of respondents from 13 countries in Africa either "agreed" or "strongly agreed" with the statement that their poor Internet connection either at home or at their university affected

²⁶⁸ The World Bank, "Crowdfunding's Potential for the Developing World."

²⁶⁹ Vachelard et al., "A Guide to Scientific Crowdfunding," 1.

²⁷⁰ The World Bank, "Crowdfunding's Potential for the Developing World," 4.

their online activity.²⁷¹ This statistic reveals an important flaw in the great hope that crowdfunding can revolutionize research in less affluent countries. If the majority of researchers have unstable Internet connections either at work or at home, and for many likely both, how is a crowdfunding campaign going to gain any traction, and how will researchers be able to reach their financial goals? So much of the basis for launching a successful crowdfunding campaign lies in a “constant marathon of social media networking,” as one researcher describes.²⁷² If, however, researchers are unable to maintain Internet connectivity to complete this marathon, chances to fund their project may dwindle. This, combined with the fact that individuals in their direct social networks (both through social media and personal relationships) may not have consistent Internet access to read or watch campaign updates or send a donation. As a result, researchers in LMICs may rely more on less direct connections (e.g. those who respond to shared content or who stumble upon a campaign page), a population that only comprises on average less than a third of contributions.²⁷³

Additionally, Experiment is not accessible everywhere in the world. While the Experiment website lists only the United States, Canada, the United Kingdom, and Australia as eligible countries to receive funding, their operations have been updated to include any country that accepts online money transfers from PayPal.^{274, 275} While this

²⁷¹ Louise Bezuidenhout and Ereck Chakauya, “Hidden Concerns of Sharing Research Data by Low/Middle-Income Country Scientists,” *Global Bioethics* 29, no. 1 (January 1, 2018): 51, <https://doi.org/10.1080/11287462.2018.1441780>.

²⁷² Vachelard et al., “A Guide to Scientific Crowdfunding,” 3.

²⁷³ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

²⁷⁴ “Frequently Asked Questions.”

²⁷⁵ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

broadens the number of countries that can use Experiment, notable exceptions include a number of countries around the world including Ghana, Libya, Liberia, Sudan, Pakistan, Afghanistan, Syria, and Turkey.²⁷⁶ A number of the countries where PayPal, and consequently Experiment, are unavailable are LMICs, further illustrating that crowdfunding platforms do not inherently solve issues with funding in lower-income nations.

A discussion of the role of socioeconomic status and success on researchers' academic careers is beyond the scope of this project, as is a lengthy history of systemic inequalities within the post-secondary education system. However, a point many researchers who study crowdfunding have written about is that launching a campaign on a platform like Experiment requires a skillset most researchers do not have. Launching a campaign is cited as difficult work, and the literature suggests that most researchers who want to use crowdfunding are not aware of the skills required to build an audience and drive page views into donations.²⁷⁷ Researchers typically spend time pre-campaign writing blog posts, recording videos, and creating social media profiles and buzz around their campaign. While this is arguably a useful skill for researchers to have in their arsenal, most researchers using crowdfunding to support their project are young — often students themselves.²⁷⁸ This means they are concerned with other aspects of attaining their degree, paying off student debt, and building a reputation for themselves in their field. The acquiring of a new skill such as video shooting and editing is perhaps attainable

²⁷⁶ “PayPal Global - All Countries and Markets - PayPal,” accessed August 17, 2020, <https://www.paypal.com/ca/webapps/mpp/country-worldwide>.

²⁷⁷ Hui and Gerber, “Crowdfunding Science,” 37,40.

²⁷⁸ Sauermann, Franzoni, and Shafi, “Crowdfunding Scientific Research,” 10.

for a graduate student with few to no outside burdens, but for those experiencing financial difficulty, who may work multiple jobs to cover tuition or living expenses, or those with other family or social responsibilities, these additional tasks add up and may create new barriers for lower-income students or ECRs who want to use crowdfunding as a way to sponsor their project. Furthermore, research on entrepreneurial crowdfunding sites has illustrated that Black fundraisers are less likely to achieve success on such platforms.²⁷⁹ From these studies, we can presume that Black researchers who experience these aforementioned hardships (maintaining sometimes multiple jobs, familial obligations, or other duties on top of their work) are set up to fail on a platform such as Experiment.

Even if many of these access inequalities were resolved, other social and relationship-related issues would remain. Experiment expects and encourages researchers who use its platform to pursue open-access publishing options and open data practices.²⁸⁰ Open data and data-sharing practices are intended to encourage the verification of previous research, the publication of publicly-funded research, and the furthering of research in a given field.²⁸¹ While the push towards open-access science and data sharing are both ideas endorsed by researchers in LMICs, at least in theory, many researchers in less affluent regions have serious concerns about open data.²⁸² While some concerns about data sharing are rooted in poor Internet access and an inability to share information

²⁷⁹ Lauren Rhue, “Who Gets Started on Kickstarter? Demographic Variations in Fundraising Success,” n.d., 8.

²⁸⁰ “How It Works.”

²⁸¹ Christine L. Borgman, “The Conundrum of Sharing Research Data,” *Journal of the American Society for Information Science and Technology* 63, no. 6 (2012): 1059, <https://doi.org/10.1002/asi.22634>.

²⁸² Louise Bezuidenhout, “To Share or Not to Share: Incentivizing Data Sharing in Life Science Communities,” *Developing World Bioethics* 19, no. 1 (2019): 20, <https://doi.org/10.1111/dewb.12183>.

even if researchers want to, the majority stem from a fear of researchers' work being "scooped" by other researchers, especially those in HICs.²⁸³ According to this study, researchers in LMICs viewed their HIC colleagues as potentially predatory, waiting for the chance to "pounce" on their data, apply it to their own research, and due to the more advanced technology readily available in HICs, quickly render the original data collected by researchers in an LMIC obsolete.²⁸⁴ In my previous chapter, I discussed the importance of trust in the building of relationships in crowdfunding. The resistance researchers in LMICs have with respect to sharing data with their supporters and presumably the world in general demonstrates the damage a lack of trust can cause. This example demonstrates that even if some of the barriers in place that currently prevent researchers in LMICs from using crowdfunding platforms were removed, the attitude researchers have about sharing data may still be at odds with those of crowdfunding platforms.

While these are but a few of the diversity-related concerns I have about the use of crowdfunding for research projects, I do not wish to imply that Experiment (and its sibling sites) are singlehandedly responsible for increasing the diversity of their user base. Just as how a single workshop or course will likely not be sufficient to entice more women to pursue careers in science and math fields, advocacy and encouragement from Experiment is likely insufficient to encourage more researchers from underprivileged backgrounds to pursue research projects. While crowdfunding is a valuable tool for ECRs

²⁸³ Bezuidenhout, 22.

²⁸⁴ Bezuidenhout, 22.

in particular, most are not relying on a crowdfunding campaign as their sole source of income or funding.²⁸⁵ Without tremendous change to the popularity and success of larger-goal crowdfunding, this fact is unlikely to change. What *is* irresponsible of both crowdfunding platforms and the researchers who are their staunch proponents is the messaging that the presence of these platforms alone encourages a more diverse and readily accessible entrée into research funding.²⁸⁶ The privilege of the ability to use Internet-based funding to communicate with social connections and other individuals with money to contribute and share hypotheses and results seems to be lost on both these platforms and their proponents. Ultimately, this oversight is most disadvantageous to ECRs and students from lower-income backgrounds and forces those researchers to continue to overcompensate with additional skills in order to compete with their colleagues with more social advantages. In this context, it would seem as though crowdfunding actually stratifies the differences between more and less affluent researchers, and it should force researchers and crowdfunding platform staff to rethink how equality and the democratization of research are discussed in conversation and the literature.

3.6 Street cred for research

In this final section, I want to address a final concern about the world of crowdfunding for research: the credibility and legitimacy of projects, and perhaps in the future, research more generally. In my first chapter, I explained how the existence of

²⁸⁵ Hui and Gerber, “Crowdfunding Science,” 34.

²⁸⁶ Vachelard et al., “A Guide to Scientific Crowdfunding,” 1.

crowdfunding provides researchers with an alternative to the paperwork-heavy process of applying for traditional grants a researcher is less likely to be awarded. While the funding success rate for crowdfunding on a platform such as Experiment is nearly double that of prestigious governmental grants,^{287,288} the broadness of who is allowed to use crowdfunding platforms and for what types of projects may soon force us to question what is considered “good” research. After the formation of groups such as the Royal Society and the institutionalization of science spurred by Bacon’s description of Salomon’s House,²⁸⁹ changes to the world of academia produced a highly-selective environment where ultimately the ability to conduct legitimate research is an opportunity for a very small proportion of the general population. Although there is a large push — from media, family, and from within academia itself — for young researchers to pursue postgraduate degrees, there is an observable bottleneck through which very few students are able to pass.²⁹⁰ While I cannot explore the modern university and the pressures and problems within its walls in depth in this project, it is important to note the overt credentialism of the modern capitalist world. While a number of jobs within research may require the expertise gained through laboratory or theoretical work undertaken during a “mere” bachelor’s degree, the requirement of a doctorate is typically used to denote one’s expertise as a researcher.²⁹¹ I would argue that the somewhat manufactured scarcity of the doctorate and the bottlenecking that occurs at every stage of postgraduate education have

²⁸⁷ “US NSF - About Funding.”

²⁸⁸ “Frequently Asked Questions.”

²⁸⁹ Klein, “Francis Bacon.”

²⁹⁰ James Cote and Anton L. Allahar, *I. Troubles in Paradise, Ivory Tower Blues* (University of Toronto Press, 2007), 27, <https://doi.org/10.3138/9781442685505-003>.

²⁹¹ Cote and Allahar, 17.

furthered the “elitizing” of research. The institutions that were launched to “withstand the domination of authority” have further rendered research an inaccessible field to those who lack the formal qualifications and/or connections.²⁹²

Crowdfunding’s existence and use in research can be seen as a paradigm shift not just in how projects are funded, but how — and by whom — research is conducted in general. Experiment’s site is full of campaigns launched by doctoral students, established professors, concerned conservation groups, and high school students all hoping to pursue a project that is likely of both personal and professional importance to them. Any project on the site has met the criteria that there is a specific hypothesis or research question being asked and that there is a need for the research being produced.²⁹³ **Figure 3** gives examples of the range of projects and people who use Experiment’s platform. Experiment’s policy on this front implies that if an individual or research team currently in high school has the capacity to ask such a question and demonstrate such a need for their project on a platform intended for adults to use, their project and qualifications are sufficiently legitimate for them to pursue funding on Experiment. This is impressive for bright, ambitious high school students who may wish to impress universities with their accomplishments, participate in a competitive science fair, or simply pursue a project they are passionate about, but what does the success of dozens of high school projects on Experiment say about the graduate students, professors, and professionals launching campaigns on the site? This is likely not a question we would ask of users of a more

²⁹² “History of the Royal Society | Royal Society.”

²⁹³ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

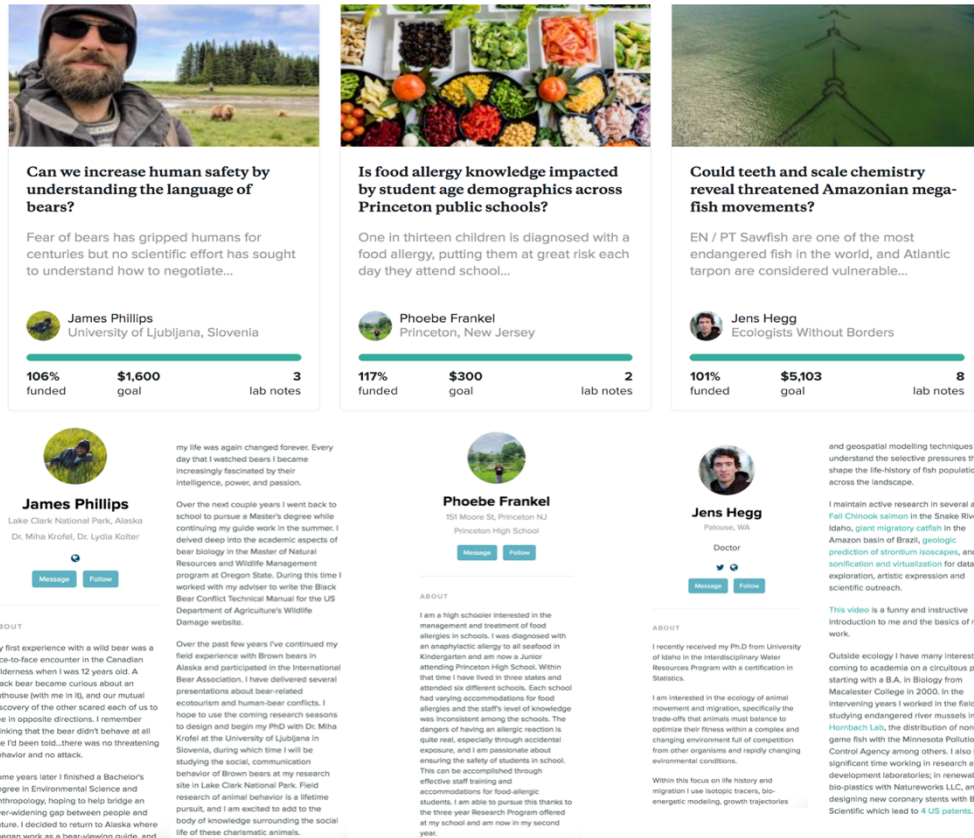


Figure 3 The top three images are the project thumbnails for a project from (L to R): a current PhD student, a current high school student, and a recent PhD graduate/ECR. The bottom images are screenshots of their biographies from Experiment. Each project and researcher has been equally legitimized by Experiment, a conclusion one can draw from the fact that each project was approved for funding on the platform.

general or entrepreneurial-focused crowdfunding site such as GoFundMe or Kickstarter, respectively, because these platforms do not purport to produce peer-reviewed results the same way Experiment does.²⁹⁴

Does the presence of researchers without advanced formal qualifications devalue the degrees professional researchers either have or are working towards? How much should a degree alone determine the legitimacy of a researcher and their project? How does the legitimacy of a researcher alter the general understanding of what constitutes

²⁹⁴ “Frequently Asked Questions.”

“good” research? These are difficult questions to evaluate, and admittedly I find myself being pulled in multiple directions in outlining various arguments for an answer to any of them. On one hand, as a graduate student who has experienced the kind of work required in an advanced degree program, I can understand why a graduate student could find the prospect of their project appearing beside a high school student’s unappealing. However, I can make the same argument about credentialism and the race to beat the bottleneck that is university graduation. Having read the range of degree expectations for Master’s students in different programs and institutions, and having made the casual observance that many of these programs seem to be “cash cows” meant to capitalize on students who are worried about the post-university job market is equally, if not more unsavoury.²⁹⁵

On the other hand, the focus on formal credentials harms students at a crucial stage in their young adult lives and without an advanced degree in a subject, prevents them from pursuing research as a career.²⁹⁶ This is a move away from the original goal of the early Royal Society and many of its sibling organizations, which sought to make scientific discovery a more public process, a practice still maintained today.²⁹⁷ Could Experiment’s move towards the inclusion of ever-younger researchers be the next step in opening the process and progress of science and research? In his paper on trust, science, and Mertonian norms, Piotr Sztompka concludes that science — and I take this to include any rigorous approach to research — has undergone dramatic change since Merton

²⁹⁵ Michael T. Nietzel, “Five Reasons Why The Master’s Degree Continues To Thrive,” *Forbes*, December 20, 2018, <https://www.forbes.com/sites/michaelt Nietzel/2018/12/20/five-reasons-why-the-masters-degree-continues-to-thrive/#7a5cb4562ff3>.

²⁹⁶ Cote and Allahar, *I. Troubles in Paradise*, 55.

²⁹⁷ David, “Understanding the Emergence of ‘open Science’ Institutions,” 575.

penned his norms. This change has led to the creation of a new paradigm of knowledge production, referred to in the literature as “Mode 2” knowledge production.²⁹⁸ While Mode 1 scientific discovery was defined based on a hegemonic approach to theoretical science, this new mode can be classified based on four different qualities: social distribution, orientation towards application, trans-disciplinarity, and its accountability to multiple sources.²⁹⁹ Soon after the initial treatise on this new mode of conducting research was presented, another new term was coined: “post-academic” science.³⁰⁰

The concept of post-academic science has been around for just under 25 years; new enough to capture the technological changes the end of the 20th century and early 21st century have brought to research but established enough to be based in trends that predate Experiment and crowdfunding for research projects. In a 1996 paper where he debuts this concept, John Ziman describes a series of changes to academic research that have rendered it too cumbersome to continue to exist purely at the purse strings of governmental grants.³⁰¹ Ziman, commenting on post-academic science, conceives of its existence as having “evolved outside academia, as a technique for applying science to... the solution of problems rather than directed towards the production of knowledge as such.”³⁰² The authors of the Mode 2 model understand the humour in writing a prescriptive approach to a model that is intended to subvert traditional forms of research

²⁹⁸ Helga Nowotny, Peter Scott, and Michael Gibbons, “Introduction: ‘Mode 2’ Revisited: The New Production of Knowledge,” *Minerva* 41, no. 3 (2003): 179–94, <https://doi.org/10.1023/A:1025505528250>.

²⁹⁹ Nowotny, Scott, and Gibbons, 179.

³⁰⁰ John Ziman, “‘Post-Academic Science’: Constructing Knowledge with Networks and Norms,” *Science & Technology Studies*, January 1, 1996, <https://sciencetechnologystudies.journal.fi/article/view/55095>.

³⁰¹ Ziman, 70.

³⁰² Ziman, 71.

publication.³⁰³ However, they have also committed to the idea that Mode 2 research is not merely a concept but rather an ongoing project,³⁰⁴ one that I believe is embodied by the aims of crowdfunding platforms such as Experiment.

Despite their faults and current flaws, one cannot fault crowdfunding platforms such as Experiment as not working towards the goals laid out in the explanation of Mode 2 knowledge production. The format of crowdfunding sites and the push towards researchers giving a compelling reason for their projects to be funded is typically application-focused, and the aspiration for open communication between researchers and their audiences is an effort to increase accountability and distribute information outside the walls of the ivory tower. The increased communication between researchers and the public also has the potential to break down the traditionally-instilled theories of various disciplines and encourage a combination of theory and practical observation to answer pressing questions in research.³⁰⁵ A marked departure of Mode 2 knowledge generation is the range of sites where knowledge can be produced.³⁰⁶ While not described in the early Mode 2 literature, I believe this should extend to who can produce the knowledge being generated and codified. The literature advocates for the inclusion of “new kinds of ‘knowledge’ organizations” including think-tanks, consultants, and activists,³⁰⁷ but this should be extended to include more members of the public, particularly those who have a vested interest in the generation of new knowledge, i.e. non-academics who wish to

³⁰³ Nowotny, Scott, and Gibbons, “Introduction,” 180.

³⁰⁴ Nowotny, Scott, and Gibbons, 180.

³⁰⁵ Nowotny, Scott, and Gibbons, 186.

³⁰⁶ Nowotny, Scott, and Gibbons, 187.

³⁰⁷ Nowotny, Scott, and Gibbons, 187.

crowdfund a research project. Mode 2 celebrates the elimination of the old structural barriers that constrained research dynamics; the introduction of direct interaction between researchers and the public represents the elimination of a significant communication barriers.^{308,309} The existence of crowdfunding platforms for research projects does not mark the end of legitimate, rigorous research. But if we have indeed entered the “post-academic” world of research, and if we wish to further develop the views laid out by Mode 2 pioneers 25 years ago, it is up to the researchers of today to continue to push the limits of what constitutes legitimate research. Nowhere are there more questions about this than in crowdfunding, and while it is a far from perfect system that ought to be held accountable to its own claims of diversity and accessibility, crowdfunding represents the future of research not only for funding, but also for the dissemination of knowledge and the inclusion of the public in the progression of research.

3.7 Concluding thoughts and looking to the future

As I have established in both this and the previous chapter, crowdfunding must take a number of steps to cement itself as a trustworthy funding system that encourages and enables a wider range of researchers to participate in the relationships it facilitates. Platforms such as Experiment must address the claims that “anyone” can access and find success on their platforms.³¹⁰ Despite the current weaknesses in the claims that crowdfunding truly encourages diversity though, the existence and growing use of these platforms demonstrates an interest in broadening research to include a wider range of

³⁰⁸ Nowotny, Scott, and Gibbons, 187.

³⁰⁹ Hui and Gerber, “Crowdfunding Science,” 33.

³¹⁰ “How It Works.”

actors and funders. The future of research and the advancement of any number of fields should not only be envisioned by residents of the ivory tower. High school students and concerned citizens may not have the same access to university libraries and laboratories, but their involvement and influence in research ought to be encouraged, and if their proposals are approved by the same bodies that evaluate proposals from academics, they ought to be supported like academics as well.

Chapter 4: Recommendations and conclusions

4.1 Overview

Throughout the researching and writing of this thesis, I have continuously tried to decide how to conclude my thoughts. I believe we have only begun to observe the opportunities and benefits of crowdfunding for research projects. My critiques over the last three chapters have largely been out of concern for an initiative that shows great promise as traditional funding systems wither. To write a conclusion on crowdfunding in research is an oxymoron — at least right now.

As some academics have discussed, it is unlikely that crowdfunding will ever replace traditional grants and awards-based funding.³¹¹ Despite the projection that crowdfunding will remain a niche source of funding in the coming years, I believe the platforms ought to operate as legitimately and ethically as possible. In these final pages I lay out some recommendations for changes that may aid in the legitimization of crowdfunding as a trustworthy option for garnering financial support for a project.

4.2 Recommendations for improving transparency in crowdfunding relationships

At the end of my second chapter, I discussed the importance of transparency in digital spaces, especially crowdfunding platforms such as Experiment. I believe that the demonstration of transparent conduct, paired with would-be contributors' demand for the same could bridge some of the current shortcomings in crowdfunding related to trust and accountability. The expectation and demand for transparency by and from each party would encourage honesty of conduct and instill trust in a way that is not often attributed

³¹¹ Byrnes et al., "To Crowdfund Research, Scientists Must Build an Audience for Their Work," 23.

to online entities.³¹² There are multiple relationships formed between the trio of contributors, researchers, and crowdfunding platforms where transparent conduct could build trust and create better mechanisms for accountability. None of the nodes where transparency ought to occur exists in isolation from the others; efforts to encourage transparent conduct by platforms for the benefit of researchers also benefits contributors and so on, further illustrating the ways any of these recommendations could facilitate major changes in the perception and trustworthiness of researchers who use crowdfunding platforms and the platforms themselves.

Transparency platforms owe researchers

Experiment's guide for researchers is long and full of helpful suggestions and guidelines for researchers. However, remedying two omissions in these guides would give researchers better insight into how the platform functions. The first of these is with respect to the review process. Other than listing their three major review criteria (that a project has a clear hypothesis or question, that it be scientifically accurate, and that the project itself is feasible),³¹³ Experiment provides little information about how their internal review works, or who conducts it. In their commonly-asked questions section, all Experiment says about proposal reviews is that: "[o]ne of our staff members reviews each submitted project. Projects that pass the content review and pass our video interview are approved to launch publicly."³¹⁴ Anecdotally, I can say that Experiment's staff have extensive experience in research and graduate school work, but this is not readily

³¹² O'Neill, "Trust and Accountability in a Digital Age," 5.

³¹³ "Frequently Asked Questions."

³¹⁴ "Frequently Asked Questions."

apparent on the Experiment website.³¹⁵ A more transparent approach in this specific component of the relationships forged through crowdfunding would be to introduce platform review staff and include the qualifications and experiences that render them trustworthy individuals to complete the review of projects. This could also facilitate trustworthiness between the platform and would-be contributors. I would recommend that crowdfunding platforms that focus on research openly acknowledge who performs the proposal reviews they receive. I would hypothesize that the knowledge steeped in their own research experience would be seen as a more trustworthy review body than one comprised of employees with a business background with no prior experience conducting research, though as of yet such a study has not been conducted.

Transparency platforms owe contributors

In addition to reviewer transparency, platforms can add a degree of transparency that could benefit would-be contributors to crowdfunding campaigns. As I discussed in my critique of Experiment's conduct in the second chapter, there is no mechanism of accountability in place to ensure researchers who raise over 100 percent of their funding goal use the supplementary funds for any particular purpose. Researchers have the option to add a "stretch goal" to the budget section on their campaign page. Experiment recommends that researchers be as specific as possible when adding a stretch goal, but they need not reach the stretch goal to receive the additional funding they receive towards that goal.³¹⁶ And as I highlighted in the second chapter, researchers do not need to

³¹⁵ Sharpe, Interview by author to gather supplemental clarification about Experiment.com policies.

³¹⁶ "Researcher Guide - Extra."

disclose what they do with their additional funding. For example, if Prof. Doe raises \$10,500, \$500 over her \$10,000 goal, but that additional money is only half of her stretch goal of \$11,000, she is still allowed to keep those supplementary funds (other than the platform fees) and use them for her project, but how? There is no promise or commitment being made by Prof. Doe to her contributors. If Experiment were to better enforce the disclosure of the use of stretch goal funding, this move towards stronger governance could also inspire trust from contributors because even if a person wishes to contribute to a project that has already reached its goal, they would still be given specific information about how their donation supports the project. Another potential change Experiment could make on this front would be to operate stretch goals on an all-or-nothing funding basis as well.

Transparency researchers owe contributors

The aforementioned ways that crowdfunding platforms can be more transparent in their conduct does not absolve researchers completely, though. I would encourage platforms such as Experiment to better enforce updates such as Lab Notes. Currently researchers are asked to upload very few project updates; they are of course encouraged to upload more, but there is no system in place to incentivize or enforce this interaction with contributors. While I believe part of the resolution to this lack of transparency is for platforms to potentially dole out funding in portions, requesting a certain number of updates before the next installment is given to researchers, there are a number of practical issues that could make this a difficult and unfair resolution for both researchers and platforms. For instance, a delay in receiving the next funding installment may throw an

experiment off course, and the coordination of funding installments may require more hands-on management than relatively small companies such as Experiment are able to provide. If crowdfunding for research becomes a larger industry in the coming years, this may be a solution, but it likely requires more time and energy than a platform can currently devote to already funded projects where the company is no longer making money from its campaign period.

Alternatively, I recommend a serious attitude change in researchers using platforms like Experiment. This is a moral argument, but one I believe can be related back to Gilbert's joint commitment theory. If Prof. Doe has agreed to Experiment's terms of use, as have her contributors, she has entered a joint commitment with them.³¹⁷ If a patron has helped back Prof. Doe's project, they have declared their intent to "do their part" in the generation of knowledge, in this case supplying funding to the research team undertaking the project. Prof. Doe can expect their financial support (and once pledged, Experiment does not allow contributors to withdraw funds), and in turn they ought to be able to expect the generation of results and updates along the way to those results, however incendiary or inconclusive they may be. Admittedly, it is difficult to control or mandate behaviour, but ensuring that researchers who launch projects on crowdfunding platforms understand and are willing to commit to regularly updating their backers makes the production of research more transparent for the contributors who have announced their belief in a project through their financial commitment to it.

³¹⁷ Gilbert, *Rights and Demands*, 165.

4.3 Future directions for research

Transparency alone cannot fill the gaps in the conduct and relationships between researchers, their funders, and the platforms the latter use to donate to the former. Future research on the ethical conduct of crowdfunding platforms used for research projects should consider some of the following questions, especially those pertaining to equity.

What are universities' and other research institutions' obligations towards training ECRs to effectively use crowdfunding platforms?

I spent my third chapter evaluating some of the equity concerns that embody some of the more abstract ethical issues discussed in my second chapter. One of the issues I drew attention to was the skillset required to be successful on a crowdfunding platform and that researchers may not already possess these skills, which include recording and editing videos, generating social media buzz, and writing blog posts about their project.³¹⁸ Many university departments, if not most, schedule seminars and workshops on the application protocol for traditional government grants, providing their students with suggestions and opportunities to receive feedback on their work.³¹⁹ If universities are beginning to embrace crowdfunding as an alternative or supplemental funding source, as some literature suggests,³²⁰ along with the homepage for Experiment, which displays tabs for campaigns from specific schools, then departments ought to inform their students of the work required to run a successful crowdfunding campaign. Future research ought to be conducted on what skills graduate students and ECRs require training for and how that

³¹⁸ Hui and Gerber, “Crowdfunding Science,” 37,40.

³¹⁹ For instance the McMaster Department of Philosophy hosts annual meetings for their MA and PhD students on the SSHRC application cycle.

³²⁰ Byrnes et al., “To Crowdfund Research, Scientists Must Build an Audience for Their Work,” 24.

training translates to the setup and maintenance of crowdfunding campaigns once launched.

How can research in LMICs be better supported by crowdfunding? Is crowdfunding the solution to distributing funding to researchers in resource-scarce areas?

An area for future investigation, particularly in global health and global bioethics are the questions of crowdfunding's efficacy in LMICs and attitudes towards data-sharing in those settings. The literature suggests that, while difficult to address, long-term incentivization is required to encourage data-sharing.³²¹ While the literature presents crowdfunding as a promising tool for researchers in LMICs, the constraints related to Internet access are currently too severe and widespread for crowdfunding to have a robust presence in LMICs.^{322,323} Researcher attitudes towards data-sharing is an active area of inquiry in global bioethics, but less research is directed to the study of making crowdfunding a more viable and equitable option for researchers in LMICs. I would encourage further investigation in this vein, keeping equity concerns at the forefront of innovation in technology for researchers in LMICs.

4.4 Final thoughts

While an exciting development, crowdfunding is hardly the first major change in the way research is organized and conducted. We are at a crucial point in the development of the rules and regulations surrounding crowdfunded research. Just as the development of research institutes required blueprints and the organization of research as we

³²¹ Bezuidenhout, "To Share or Not to Share," 24.

³²² The World Bank, "Crowdfunding's Potential for the Developing World."

³²³ Bezuidenhout and Chakauya, "Hidden Concerns of Sharing Research Data by Low/Middle-Income Country Scientists," 51.

understand it today required norms, crowdfunding for research must develop a stronger backbone in order to ethically facilitate research, perhaps even more equitably than traditional funding avenues have permitted.

Crowdfunding is not and will likely never be a panacea. It cannot “level the playing field” without any other changes made to better include marginalized researchers or those living in lower-income regions. As I hope I have driven home in the preceding chapters, crowdfunding shows great promise for the world of research. Without strong governance, the development of trusting relationships between the parties involved in crowdfunding, and the inclusion of minorities and groups previously underrepresented in research, crowdfunding cannot become the equalizing force it is held up to be by its champions.

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