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An existentialist approach to authentic science

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ABSTRACT

The pressures of the ethos of "publish or perish" in academia has led to a multitude of issues for science and scientists. In this paper, we argue that the existentialist philosophy concept of authenticity would be useful for scientists to prevent issues of reproducibility, data manipulation, fraud, and mentorship. We highlight some major caveats and call for policies to prevent them. Overall, we propose a way for scientists to ensure they do not succumb to the pressures of a career in science.

Introduction

Existentialism is a philosophical idea that existence precedes essence, which means that above the labels, roles, or stereotypes that one may be given, we are first and foremost independently acting conscious beings. Quoting Jean-Paul Sartre from "Existentialism is a Humanism", his famous essay defending existentialism (Sartre, 1946):

> *"We mean that man first of all exists, encounters himself, surges up in the world—and defines himself afterwards."*

Sartre goes on to explain that the implication of this is that, as humans, we have the freedom of choice and are therefore responsible for our actions and the decisions we make.

> *"Thus, the first effect of existentialism is that it puts every man in possession of himself as he is, and places the entire responsibility for his existence squarely upon his own shoulders."*

The primary virtue of existentialism is authenticity, whereby choices are made autonomously with full responsibility and avoiding "mauvaise foi" or bad faith, a phenomenon in which an agent adopts false values due to external or social pressures, and in doing so, denies their own freedom.

In this article, we argue that the existentialist account of authenticity is a beneficial approach for the way we should conduct science, and its adoption would ensure scientists do not succumb to the pressures of a career in science. This paper is meant as a guide for scientists to conceptualize the use of existential philosophy in navigating science in academia and industry. It is not an in-depth analysis of existentialism in science, such issues of funding, publishing, and society's views on science, but rather a discussion of scientists and their individual responsibilities. While we will not discuss the criticisms of existentialist philosophy itself (though we do discuss some specific criticisms in regard to its use in the scientific process) as much has already been written on it, it is important to note that at its core, biological sciences seem to argue against "existence precedes essence" in that individual differences in behavior are nearly always influenced by genetic factors (Kendler and Greenspan, 2006). However, similar to many of Freudian theories being flawed (Webster, 1995), yet theories on anxiety developing from traumatic memories (Breuer and Freud, 1893) are still relevant to modern research on anxiety; aspects of existentialist theories are still relevant in virtue ethics in science – something we will argue in this paper.

The problem

I think it is fair to say that most scientists start out their careers with noble ideals, perhaps with the goal to better humanity or perhaps out of curiosity of the world we live in. However, the pressures of an ingrained ethos of "publish or perish" and the ever-increasing demands for research outputs, has led to a situation in which many scientists end up pursuing higher numbers of publications and higher impact papers. Quoting the 2017 Nobel Prize Laureate Jeffery Hall (Hall, 2008):

> *"In my day you could get a faculty job with zero post-doc papers, as in the case of yours truly; but now the CV of a successful applicant looks like that of a newly minted full Professor from olden times."*

One might argue that this is not a bad thing, but would pursuing more publications and higher impact papers increase productivity and the quality of science? We argue that this research culture causes

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immense harm to both science and scientists. First, when the focus shifts to churning out publications instead of pursuing good science with well-designed and well-executed experiments, issues of reproducibility, ethics, and rigor start to emerge. For example, the high demands of publishing might drive a researcher to seek out significance by running a high number of experiments but only presenting significant data or data that fits the hypothesis, or by not replicating experiments or manipulating statistics or "p-hacking". Second, the demand for research output can change mentorship dynamics, for example, between a primary investigator (PI) and their Ph.D. student. Instead of training their students to become better scientists by mentoring them on how to synthesize hypotheses, to design controlled experiments to test these hypotheses, and to properly analyze the results and understand it in the context of the literature, the pressures of research output can easily push a PI to use their students as a means to generate data. Although we acknowledge that quality of teaching is independent or mildly correlated to publishing (Centra, 1983) and that good training can indeed lead to better research output, there is still the temptation to treat the students as a way to get publications rather than as young scientists-in-training. Third, the demand for increased output becomes a burden on scientists generating the data, which we argue is a huge reason for the high levels of mental health issues in graduate students and academic staff (Court and Kinman, 2008; Evans et al., 2018; Watts and Robertson, 2011). Overall, the increased pressures of academia are detrimental to both science and scientists.

The existentialist approach

A key tenet in existentialist philosophy is that, as humans, we are "cursed" with absolute freedom (at least in atheistic accounts such as that of Sartre) and are thus responsible for the choices we make. If we abdicate this responsibility (such as succumbing to the pressures of society), we fall into bad faith. We argue that some concepts developed in existentialism can provide insights on how to develop better practices for scientists to navigate the pressures of academia. By the existentialist approach, we are free to choose that which we desire to be. As scientists, we make a choice in 'becoming' a scientist, and with it, the loss of certain freedoms (in abiding professional code of conducts, for example).[1] To stay authentic, we need to accept the burden of the loss of freedom by taking responsibility for this choice—by accepting the loss of freedom in 'becoming' a scientist committed to the truth and to the energetic search for it. Scientists should therefore conduct science authentically with the noble ideal to better humanity. Embracing freedom means not succumbing to the pressures of "publish or perish", but rather to pursue good science. This then has implications on the problems of reproducibility, data manipulation, falsification, fraud, mentorship, and so on, as mentioned above. This is particularly important in the current climate of academic research with increasing rates of retractions due to fraud (Steen, 2011), more researchers admitting to questionable research practices (Fanelli, 2009), and greater evidence of more research with false findings (Ioannidis, 2005). Having an existentialist approach means that we can no longer blame our actions on the pressures placed on us by the system. The PI should be fully responsible for his/her actions and how they treat their students and staff, and fall into bad faith if they claim they need to publish papers to retain their jobs. On the other hand, pre-independent researchers can no longer place the responsibility of how they conduct their research on the pressures placed on them by their PIs, as this similarly falls into bad faith. In either case, the agent cannot place responsibility on the system as that will fall into bad faith, instead the agent has to be responsible for her action. Given that the agent chose to become a scientist, one who agrees in the pursuit of truth within the constraints of professional code of conduct (as argued above), the agent therefore cannot justify any misconduct as that will be done in bad faith. Overall, we argue that approaching science through an existential perspective would place the responsibility squarely on the individual, preventing misconduct in research and creating a better environment for scientists.

Why existentialism? Rather than providing clear guidance, philosophical idealisms when applied to real-world situations can often add confusion. While the tension between idealisms of philosophies and the reality of a modern scientific career can bring up more questions that they answer, we argue that these questions are worth bringing up, as they highlight issues that we as scientist should question, contemplate, and strive to overcome. There are also many other theories in which scientific ethics can be and are indeed based on. We do not argue that existentialism stands as the only theory or even the best theory when it comes to ethical issues in science, but rather compliments other theories already discussed and applied in ethical science. We argue that existentialism provides a layer of personal responsibility beyond that of professional codes of conduct, and is complimentary rather than oppositional to current concepts. There are situations in which these codes of conduct realistically limit freedoms per se (e.g., Institutional review boards rejecting non-conforming studies), however, we argue that understanding the principles of existentialism in tandem with these codes of conduct would create more robust ethical behavior than simply conforming to latter. These codes of conduct then act as facticity (a limitation and a condition of freedom based on things one did not choose that are "set in stone"). Similarly, seemingly incoherent philosophical theories such as Aristotelian virtue ethics which are agent-focused and depends on human nature that exists independently of the agent (unlike existentialism which is agent-based and denies the existence of human nature) are not always entirely incoherent and can at times be naturalized as facticity – existentialism can be seen as a agent-based account of virtue ethics.

Caveats

An immediate issue of applying an existentialist approach in science (or perhaps in general) is that of responsibility. By responsibility, we do not mean the responsibility of freedom as stated by Sartre, but rather personal responsibilities that challenge Sartre's view of freedom. Throughout our lives, we have responsibilities that perhaps realistically limit our freedom. While an existentialist might argue that this constitutes bad faith as said responsibilities can be seen as "societal pressures" (making decisions based on responsibilities can be seen as putting blame on them and hence being inauthentic or falling into bad faith), they realistically remain a consideration for how one acts, and rightly so. For example, if an academic has a family with young children, then surely, they would be mindful of the implications of losing one's job due to low numbers of papers or fewer high impact publications, resulting in the loss of income, needing to relocate, and other consequences. In such situations, we argue that an existentialist thought process would still be beneficial, as it forces one to take into consideration the authenticity of science (or one's original intent of pursuing a career in academic sciences). This would be beneficial in two ways: 1) it would prevent certain actions that cross the line (e.g., falsifying data) and 2) if one succumbs to the pressures of academia due to personal responsibilities, it would taper the extent of such acts. Overall, although a researcher might not be fully authentic in conducting science due to extraneous responsibilities, an existentialist approach could minimize any emerging issues.

Another major problem perhaps lies in the economics of the existentialist approach. Regardless of how one conducts research, be it authentic or not, the "invisible hand" of the capitalistic "publish or

[1] We take here a stance against a fully epistemological anarchistic (as suggested by Feyerabend (1975) in "Against Method") in scientific pursuit (though we do recognize that Freyebend was making a reducto argument anyway). We reconcile this with the existentialist philosophy by stating that it is indeed a choice by the agent to become a scientist, and with-it choosing loss of freedom in the form of professional code of conducts, one which the agent must be responsible for if the agent wants to remain authentic.

perish" system of academia would still favor researchers who have more publications and more high impact papers. This system puts pressure on academics to publish more in order to stay relevant in the eyes of the institution that values publishing, which is reminiscent of the economic concept of rent-seeking behavior[2] (Muller, 2017). Such a system can lead to academics following the path of least resistance to obtain short-term rewards/funding. It then becomes conceivable that authenticity (in the existentialist sense of the word) in science might be unintentionally "weeded" out by the system. In our above example, a PI who exploits their students to generate more data at the cost of their development would produce more publications and continue to get grants and promotions, whereas a PI who mentors their students to be good scientists would have a fewer publications and would receive less funding. Similarly, rigorous science requires repeat experiments and robust statistical analysis, but p-hacking or even fraud if undetected (in our opinion, this happens a lot) generates more significant data that leads to faster publications with higher impact. Perhaps like economics, policies need to be in place to prevent such "market failures" in science. Policies need to encompass a more holistic evaluation of the quality of work, rewarding good mentorship over data generation, and taking into consideration the research output beyond the impact factor of journals publishing the papers. What exactly these policies entail would require careful consideration by economist, politics and policy researchers, scientists, funders, and publishers.

Combining the above caveats, a central theme of idealism comes to mind, but are theoretical philosophies such as existentialism overly idealistic to be of benefit to a pragmatic venture such as science? The endeavor of taking abstract and perhaps insensitive ideals of a theoretical philosophy and applying them to specific situations of scientific ethics might appear to be impractical. Furthermore, is existentialism internally incoherent to the real-world pressures that we have accepted in our choice (assuming it is one of good faith) to become a scientist by choosing the loss of certain freedoms and putting blame on the loss of these freedoms? Much has already been argued on the practicality of ethical philosophy, for example, proponents of the "anti-theory" such as the objection of reductive ethical theory and it's lack of authority (Williams, 1985). Is there any value in an existentialist approach for scientific ethics? As mentioned above, we argue that existentialist theory is complimentary to other philosophical theories and professional codes of conduct. It adds a layer of personal responsibility in which existing ethical guidelines might be lacking. For example, it is perfectly ethical according to professional guidelines to not repeat experiments if statistics sufficiently argue for a certain hypothesis; however, if a scientist authentically seeks the idealism mentioned above, effort would be made to ensure reproducibility through repeat experiments. Being authentic as a scientist would therefore mean resisting the pressures to take "shortcuts" like not replicating experiments, as being authentic as a scientist is to be in earnest pursuit of the truth, above the pressures of publications, impact factors, citations, etc. – something that can only produce better science.

However, scientists can be arrogant, hostile, overly driven by their career etc., and being free from authenticity under these conditions might lead to some very bad behavior. Therefore, existentialist theory alone may be insufficient for ethical science in such cases, rather it should act as a compliment to other ethical theories and codes of conduct. There are also arguments that the existentialist theory is incompatible with other theories. For example, adherence to a professional code of conduct appears to be exactly the kind of external values that existentialists tend to question—"good science" following a professional code of conduct will inherently be subject to the essence of the code, whereas existentialism at its core asks that an agent determines their own essence and questions an enforced "essence" placed on said agent. How then can scientists resolve such contradictions? Similar to our above arguments of responsibility, we believe an existentialist thought process can still be beneficial. Ethical codes of conduct dictate acceptable behavior in a profession, and we propose that they should be adhered to if one is considered a member of said profession. A scientist could however apply existentialist precepts complimentary to already existing ethical frameworks like professional codes of conduct by adhering to the "spirit" in which this code was derived to avoid unethical actions. Overall, we argue an existentialist mindset complimentary to other ethical frameworks could still be effective in preventing certain unethical actions, and to avoid certain "lines" from being crossed or reduce unethical actions.

Conclusion

The pressures of modern academia have inevitably caused a myriad of issues that have unfortunately distorted the intent of many scientists, creating a situation where science and scientists are under extreme stress. In this article, we argue that by using an existentialist approach, scientists will be obliged to come to terms with their responsibility of freedom, leading to choices that are authentic. It is worth noting that many other philosophical theories exist in which science can be conducted, and existentialism is but one that we propose. Critical thinking, through philosophical theories, can be useful tools for a scientist ability to make good judgements in cases where rigid doctrines, like code of conducts, can be skirted. Articles such as the present hence serve as a means to which scientist can engage with philosophical thought in order better the way in which we conduct science. However, more discussions based on philosophical underpinning would be useful in this pursuit. Although issues in funding, measures of success, and how society views science may appear to challenge the use of existentialist concepts in ethical science, by practical adoption of an existentialist philosophical approach in compliment with existing ethical theories and codes of conduct together with sensible policies to prevent "market failures", we can begin to reform areas of academia that appear to be broken by the high pressures of "publish or perish".

CRediT authorship contribution statement

Shawn Zheng Kai Tan: Conceptualization, Writing – original draft, Writing – review & editing. **Lee Wei Lim:** Writing – review & editing, Supervision.

Ethics Statement

All authors declare no competing financial interests or potential conflicts of interest.

Data Availability

No Data was used in this manuscript.

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[2] Rent-seeking behavior seeks to increase one's existing wealth without creating new wealth. The theory is when the most talented individuals go into rent-seeking (the most lucrative) fields like finance, law, etc., instead of entrepreneurship, the economy is negatively affected because this does not encourage innovation and growth (Murphy et al., 1991). Muller (2017) used Tollison's analysis of rent-seeking (Tollison, 2012) as "the study of how people compete for artificially contrived transfers" and parallels it with academia and publishing.

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