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Philosophy of Science

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Redefining the Philosophy Behind Science

Thomas Kuhn's *The Structure of Scientific Revolutions* describes science as dependent on three properties. First, it depends on a united scientific community. Second, science exerts its authority over society through scientific institutions. Third, future generations are trained to practice science through learning from textbooks, which standardize scientific learning. I see issues with each aspect of Kuhn's definition of science. What I have experienced, as somebody who considers themselves a scientist, is that first, the scientific community is deeply divided by identity. Institutions that maintain science's authority over society are historically predominantly white institutions, male-only institutions, and in general are rife with discrimination. Secondly, the authority they continue to wield today is ingrained with principles and values from a society built on colonization and slavery. Columbia University was founded in 1754, twenty-two years older than America itself, and has a long history of white, Western supremacy. Thirdly, textbook writing is a heavily edited and biased process that very intentionally chooses who gets included. A study published by the The Royal Society in 2020 has shown that approximately 90% of the scientists we learn about in textbooks are male and around 97% are white. The way Kuhn talks about who

the scientific community is composed of throughout *Scientific Revolutions* are the people who we are taught can be scientists. His repetitive use of men-- 58 times throughout the book, whereas people is used 11 times and women is used 0 times-- when referring to scientists shows patriarchy is fundamental to his conceptualization of science. His conceptualization is racist as well. In Chapter XIII: Progress through Revolutions he writes, "But only the civilizations that descend from Hellenic Greece have possessed more than the most rudimentary science. The bulk of scientific knowledge is a product of Europe in the last four centuries. No other place and time has supported the very special communities from which scientific productivity comes." His language here reveals his bias towards Western supremacy, operating on a level that precedes his philosophical analysis of science. Kuhn completely disregards the scientific achievements of Asia, Africa, and the Americas pre-colonization, qualifying them as rudimentary when the knowledge European scientists were able to discover would never have been possible without numbering systems, the calendar, advancements in geometry and civil engineering, materials science, chemistry, astronomy, and anatomy, all fields not created by Europeans. He discards centuries of scientific inquiry because the community that he believes supports scientific productivity does not align with the communities that actually produced scientific knowledge.

Unfortunately, this view of science and of Europeans being the sole pioneers of science is not just one man's opinion. *Scientific Revolutions* writes about the way we all see or should see science. Pointing out Kuhn's flaws and telling students to read around or ignore the problematic parts of his writing doesn't address the problem inherent in the discipline itself. When we think of science, we think of a white, male science. What

we practice is not a science that is informed by or inclusive of identities outside of being white and male; it is founded on discrimination and enforced by discriminatory institutions. This causes extreme tension for people who are both interested in (white, male) science and hold identities that have been historically excluded from the institutions that enforce science's authority and from the scientific community.

This tension may not be obvious to some readers, so I want to delve deeper into why this issue exists for non-white, non-male scientists. As non-white non-male scientists like myself progress in our scientific careers, we begin to see how there is rarely space for both who we are as scientists and who we are as people. The sentiment I've heard repeatedly by older generations of scientists is that one's identity "doesn't matter" if the science they do is good. This "value-less" view of science is seen as positive and is marketed towards future generations, selling the idea that going into science means that you will only be valued for your intelligence, that personal and/or societal biases don't exist when you become a scientist. Kuhn asserts the value-lessness of science as well, saying,

> "Just because he is working only for an audience of colleagues, an audience that shares his own values and beliefs, the scientist can take a single set of standards for granted… Even more important, the insulation of the scientific community from society permits the individual scientist to concentrate his attention upon problems that he has good reason to believe he will be able to solve… The effects of insulation from the larger society are greatly intensified by another characteristic of the professional scientific community, the nature of its educational initiation."

But the value-less view of science is incorrect and harmful to minority scientists. There is no "insulation of the scientific community from society". Kuhn failed to take into consideration that scientists, who are all white men in his writing, are able to separate themselves from society because their identity places them at the top of the social hierarchy, where they can remain blissfully ignorant about societal issues because it doesn't affect them. Science assumes that a scientist is a white man and because education was limited to white men for so long, science became seen as "value-less". In truth, it values white men, solely acknowledges them, created institutions to further their pursuit of knowledge at the expense of other races and genders, and only writes about them in its textbooks which are only written by white men. The discriminatory nature of science has been obscured by an objective pursuit of knowledge, preying on the innate curiosity about the world and its workings we feel as human beings, and subjecting those who don't fit the model of a scientist to discrimination on levels ranging from the interpersonal to the unforgettable historic.

Many think that science is one of those fields where if we continually compensate for the lack of diversity through creating pipeline programs and Diversity, Equity, and Inclusion (DEI) committees, the issue with racist scientists, teachers, publishers, etc, will resolve and science can keep going and forget about its racism. But no amount of representation or reform will fix a philosophical flaw in the concept of science itself. Access to education, dealing with microaggressions, and most importantly for future scientists, navigating through scientific institutions which have their own institutional systems of oppression, are all significant obstacles in our scientific careers. Deep changes in the way society is structured is needed to eliminate

those problems and I think if that point ever happens, we would find that scientific institutions need to be uprooted and destroyed as well. In order for scientists of all backgrounds to actually become part of the scientific community, we need to redefine what science is external from discriminatory biases.

So now, I feel like this raises the question of why should white male scientists care? Clearly the system is designed for them to thrive, puts them on a pedestal that allows them to pursue knowledge without a care for other humans, so what incentive is there for them to change this system? The answer I see is that this exclusion of people from doing science makes science weaker than it needs to be. How can science be a thorough investigation of the world if not every type of person is investigating each aspect of the world that matters to them from all possible perspectives? I agree with the idea that science is strong because of a united community, but we could do so much better in uniting this community and strengthening science as an investigative force. We need the concept of science to include that science is a place where historical, identity-rooted discrimination is addressed and understood by all.

In order to do this, we need to redefine science but we have two choices. We can either completly agree with Kuhn and say it does depend on community, institutions, and textbooks, but we need to make explicit that it's inclusive, or we can reformulate an idea of science that has no connection to misogynistic and racist philosophy. I think the true understanding of science should be the second one, but it's hard to envision what our ideal scientific society should be without trying to think of what society should be free from systems of oppression. This isn't a weakness in my eyes though, but rather a new analysis on how science and social identities are deeply intertwined and an

argument in favor of how powerful inclusion and acceptance can be in further understanding the world we live in. To be a truly good scientist, you should not only not see science as value-less but actually value that its power comes from diversity of thought and methodology.