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Conceptualising Doing Things: The Experience of Collaboration for Community Groups and Academics while Addressing Environmental Justice

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Abstract

What happens when academics, who 'conceptualise research questions', and community groups, which aim to be 'doing things', collaborate? Building on science and technology studies research about collaboration, we focus on the collaborative experiences of teams of academics and community groups to address environmental justice. Our research reveals a tension between the way the two sets of actors understand the purpose and mode of science within environmental justice collaborations. We explain this tension by exploring the motivations of the academics and community group managers and by how team members arrived at a shared understanding of collaboration itself. Our findings reveal that the purpose and mode of science within the collaborations that unfolded can best be understood not as conceptualising research questions or doing things, but rather as 'conceptualising doing things'. Recognising this merged understanding of science could be beneficial in enhancing and accelerating the work of community group-academic collaborations labouring together to address environmental justice challenges.

Keywords: Collaboration, Environmental Justice, Academics, Community Groups, Field Theory, Research Questions

Introduction

> Collaboration, to me, is a hotpot or picnic or a stew…each person brings something to the table and then you try to make a dish out of it.

With this tasty reflection during an interview, a project manager for Trees Matter helped us frame how we can think about collaboration between community groups and academics.[1] Trees Matter participated in one of the collaborations

within Project Confluence, a study and intervention we conducted to explore the interactions between community groups and academics as they address issues of environmental justice in Phoenix, Arizona. Convivial metaphors aside, scientific engagement with the wider community beyond the confines of the laboratory or the classroom has long been an important topic in the social studies of science (Michael, 2002; Leach et al., 2005; Morris and Hebden, 2008). At times, an important piece missing from these studies is how collaborators experience this kind of engagement, or "the stories that try to capture what it feels like when participation happens" (Kelty, 2019: 9). Thus, for this project manager, that story can be described as a hotpot-like experience of interacting with academics and her fellow community group members.

The research question guiding our work is, *What are the experiences of community groups and academics collaborating to address environmental justice challenges?* We provide a narrative account of the tension within collaborations between (a) implementing a project to address a challenge, and (b) conceptualising a research question to better understand that challenge. Our observations and interviews of the teams involved in our intervention have helped us think through what conducting engineering, technical, and scientific work[2] means within such collaborations and what these insights might hold for future collaborations that desire to address issues of environmental justice.

Although often rejected by science and technology studies (STS) scholars, what is perceived as 'science ' is often premised on the idea of formulating and testing hypotheses or searching for answers to research questions. This focus on research questions as a key element of the scientific method comes from a positivist interpretation of knowledge as 'scientific' if it has established "formal relations between theories and data, whether through the rational construction of theoretical edifices on top of empirical data or the rational dismissal of theories on the basis of empirical data" (Sismondo, 2010: 6). Applied research design begins with a first stage of defining a research question, a second stage of designing a research plan, and then a third stage of executing the plan that would help answer the research question (Bickman and Rog, 2009). Thus, we understand collaboration to be a mode by which interdisciplinary community science is organised and conducted to implement applied research. However, we found that the literature has yet to explain what the experience of collaboration means for the practice of science.

We discovered the idea of 'making and doing' science (Downey and Zuiderent-Jerak, 2016) emerged as a central component to the collaborations explored in this intervention. However, as we will also see, it may be best to think of 'making and doing' in parallel or on a continuum with the kind of theorisation that we tend to associate with conceptualising research questions. With this article we want to ethnographically unpack how collaborations transition from a set of diverse but ambiguous social relationships to a focus on 'making and doing'. After providing a framing for our study and an introduction to our intervention, we first analytically explore the drivers, inputs, and outputs of the community group and academic collaborators. Then we consider what collaboration meant to each team and how the team members arrived at a shared understanding of collaboration. Finally, we will discuss how collaborators understand the relationship between 'doing things' and 'conceptualising research questions' within the teams.

Labouring together

For Project Confluence, we—the authors of this paper—have defined 'collaboration' to mean community groups 'labouring together' with academics to address an environmental justice challenge. Labouring together includes the work, communication and exchange of knowledge that occurs when these two sets of actors are finding solutions to these challenges. While this is the way collaboration has operated within Project Confluence, the interactions we have observed between team members also reflects a co-produced and emergent understanding of participatory research (Chilvers and Kearnes, 2015). The emphasis on labouring together in this definition is also important because it signifies a "basic individualism that must be overcome, a sense of bringing

together what is separate, or of placing side by side" (Kelty, 2019: 31). However, as the reader will see, a shared understanding of collaboration was negotiated by those who laboured together in our intervention. Part of that negotiation was deeply influenced by diverse understandings of how science supports conceptualising research questions or placing knowledge into practice to address social problems.

Previous social studies of collaboration in science have focused on the interactions of groups of academics (Cummings and Kiesler, 2005; Balmer et al., 2015), which more recently has been described as 'team science' (Tebes, 2018). STS has noted how collaborations navigate language, concepts and knowledge integration across different disciplines (Jeffrey, 2003; Rival, 2014) and explored cross-sectoral scientific collaborations (Garrett-Jones et al., 2005). More recently, critical analysis has been conducted on interventions within action-oriented STS (Zuiderent-Jerak and Jensen, 2007), citizen science collaborations like Bucket Brigades (Ottinger, 2010) as well as virtual engagements found on digital platforms (Baudry et al., 2022).

The four community groups at the heart of Project Confluence are motivated by addressing environmental, climate and energy injustice. Such challenges are often tied to poverty, race, and a lack of technical resources (Mohai et al., 2009), which are concerns for each of the teams. There are many studies of collaborations between academics and community groups addressing environmental justice (Davis and Ramírez-Andreotta, 2021; Yuen et al., 2015), and often, they are framed as evaluations of community-based participatory research (Burwell-Naney, 2017; Lantz et al., 2001). Rather than an evaluation, in this paper we explore ethnographically how these two different kinds of actors—community group managers and academics—experience collaboration while addressing issues of environmental justice. So, unless otherwise noted, when we are discussing collaborations, it will be in the context of collaborations between community groups and academics.

Within STS literature there are also four elements, namely community leadership, interdisciplinarity, flexibility, and building trust, which are important for framing both the collaborations within Project Confluence and those that address environmental justice in general. For instance, with regard to leadership, community members are often already at the forefront of environmental justice issues, such as the activist work conducted by Deborah Thomas on fracking in collaboration with academics like Sara Wylie (Thomas, 2017). At times the leadership of community members can even be surprising for us as analysts within a collaboration. As we attempt to both engage with our collaborators and learn from them, they can change or adapt the project in unforeseen ways (Downey and Zuiderent-Jerak, 2016). Interdisciplinarity is central to addressing issues of environmental justice and community groups are often searching for diverse forms of expertise to support their organisational goals (Macias et al., 2022). Team science has been considered as an interdisciplinary approach to addressing environmental justice issues (Wallerstein et al., 2019). The interdisciplinarity inherent in community science is a better fit for ensuring community members are centred within collaborations. Further, as a form of community-based participatory research (CBPR), community science highlights the "formal and informal educational experiences of community members" (Carrera et al., 2019: 3). Community science was initially identified as distinct from other forms of CBPR because of its focus on improving the quality of life of a given community (Wandersman, 2003). Additionally, community science recognises that community members have the agency and interest to engage in science in the service of their community (Adams, 2012). Collaborative environmental justice work also tends to require time and space for community members to define how their local environmental challenge is understood. As some have noted, research oriented towards addressing such challenges should support the labour of communities by "applying flexible methods responsive to local contexts" (Allacci and Magder, 2014: 39). Finally, building trust is essential for ensuring that collaborations can provide benefit to the community that is most directly affected by the process of an intervention and its outcome (Brown et al., 2012). There are many examples of academics exploiting communities through collaboration

in order to further their own interests, however well-meaning, through damage-centred research (Tuck, 2009; Carrera and Key, 2021). Overall, environmental justice collaborations try to ensure that community leadership is valued, that a community science approach organises interdisciplinarity in the collaboration, that methods are flexible to the challenges faced by the community, and that relationships between collaborators are built upon trust.

Because of the direct connection to environmental justice and the reflexive nature of our study, it is necessary to properly locate this research within a theoretical framework that may be considered heterodoxic within some interpretations of STS. Environmental justice collaborations are inherently activist and therefore politically motivated to use science to improve the well-being of their local community. Social justice theory has recently been recognised as a normative way to approach long standing questions within STS (Sovacool and Hess, 2017). While agency-based frameworks have noted that topics such as the interests and motivations of scientists may be irrelevant to why a scientific theory becomes dominant (Callon and Law, 1982; Wynne, 1992) such frameworks are "less well-suited to study the problem of the ideological valences of the intellectual field" (Hess, 2013: 186). With this in mind we draw primarily from field theory in order to balance our explanations of how social structure, agency, and systems of meaning can influence—or motivate—a participant's experience within an environmental justice collaboration (Bourdieu, 1975).

Studying an intervention

Project Confluence implemented a hybrid research approach (Schmitt et al., 2022) to create an umbrella of funding and networking that reflects the continued complex evolution of the interaction between the university and society (Tuunainen and Kantasalmi, 2017). This hybrid research approach allowed us to both centre the challenges faced by the community groups that were actively searching for support from academics, while also giving us an opportunity to explore how these actors experience collaboration. Building upon Liboiron's notion of anticolonial approaches to science, the hybrid approach of Project Confluence also required us to consider the *how* of science through "a genre of relationality based in obligation" (Liboiron, 2021:120). In order to properly integrate our research within an environmental justice approach, our obligation as researchers is to take the words and actions of our participants seriously so that we can properly understand how science works in their community. In this sense, science is constituted by relationships, as is commonly understood within STS literature, and "accountability is the way to describe that constitution" (Liboiron, 2021: 121).

Although Project Confluence was designed to allow us to study the evolution of collaboration between community groups and academics, our interventionist framing is quite similar to the collaboration between social scientists and medical physics researchers analysed by Morris and Hebden (2008), which suggests that there is benefit both to research outcomes and for participants when our research design and approach is more reflective and attentive to the perspective of our interlocutors. In this sense, our methodological approach to data collection and interpretation that is described below is heavily influenced by anthropology, which at least in the past three decades of studying environmental justice has properly recognised the obligation we have to those we research (Johnston, 1994; Fortun, 2001).

For Project Confluence, we organised four collaborative teams between community groups and academics. We first contacted 28 community groups focused on addressing environmental, climate and energy injustice issues in Phoenix and then workshopped the most pressing challenge faced by each organisation looking for academic support. In the end, we selected four community groups and their scientific, engineering, and/or technical challenge morphed over time to become the focus of the teams, as discussed in Table 1.

Fifty-one academics were contacted with an introduction to one of the four community groups and a description of the challenge they wished to address. While eleven academics initially agreed to join the projects, three quickly had to withdraw due to time conflicts. Later the OCLC

Table 1. Details on community groups collaborating in Project Confluence

Community Group	Community Group Mission	Challenge Identified
Arizona Faith Network (AFN)	Inviting people into meaningful relationships, shared prayer and dialogue rooted in our faith traditions, and actions that influence public awareness, engagement and policy.	Design a coalition to coordinate faith-based cooling centres in response to the extreme heat events
Trees Matter	The Valley has an immediate need for an increased tree canopy; Trees Matter works to alleviate this need by educating the public on tree knowledge, and distributing desert-adapted shade trees to residents across the Valley.	Create a digital platform through which the general public can interact with their local canopy.
Orchard Community Learning Center (OCLC)	Creating a flourishing local food system by supporting Phoenix growers. Part of the Spaces of Opportunity partnership, to enable all Phoenix families to have affordable access to healthy food, active living and connection to their cultures.	Develop an efficient irrigation system design for improved water resources management at the Spaces of Opportunity community farm and incubator.
Indigenous Vision	Indigenous Vision works to revitalise Indigenous communities – culture, people, and land – by providing educational resources through quality programs that promote well-being.	Building a map and database of pollution/land degradation on Indigenous land in North America

team added two undergraduate students and the AFN team incorporated a graduate student. We provide details on each participant's expertise and previous experiences collaborating in Appendix A. Importantly, Indigenous Vision withdrew from Project Confluence before the first deliverable (the memorandum of collaboration; described below) was due, but after the first interviews were conducted (also discussed below). While Indigenous Vision mentioned their withdrawal was because of a lack of available time on their part, we do not have empirical material to fully determine exactly why they withdrew. (As is evident from our results and discussion, we recognise that participation or withdrawal depends on whether it is possible to find common grounds for collaboration so that it will lead to a benefit for all engaged.)

We required the teams to complete two major deliverables between May 2021 and January 2022, the requirements for which we designed. First, they had to establish a *memorandum of collaboration* (MOC; Fawcett et al., 2000), to define the goals of the team, roles, responsibilities, participatory processes for decision-making, maintaining trust, how conflicts could be resolved, data collection and management, codes of conduct, and details on ownership of work. The MOC requirement was inspired by the idea of a 'memorandum of understanding' that is created to articulate the aspirations and norms between different parties (organizations or individuals) and guide their relationship.

We believed the MOC would be critical for collaborators to meet the second required milestone, the creation of a *collaborative challenge assessment* (CCA). Intended to be collaboratively created, we envisioned the CCA as a product that would assess and plan a roadmap to address the community group's challenge (Schmitt et al., 2022). Inspired by 'technology needs assessments' (Haselip et al., 2019), we intentionally steered away from the word 'needs' because of its 'deficit' connotation and encouraged participants to draw upon an asset-based approach (Mathie and Cunningham, 2003). We suggested that the CCA should answer at least three questions: (1) What must be accomplished to address the challenge identified by the community group? (2) Why? (3) How might things get done, and using what resources? Given the nature of community-based work and our intention to not be overly prescriptive, we encouraged teams to allow the CCA to take whatever form made the most sense for the

community group, whether a formal document, a presentation, or even a pitch for fundraising.

Further, to aid in the creation of the MOC and the CCA, we provided the teams a budget of $10,000 (through the grant that supported this work; see Acknowledgements) that they could use for things like data collection, purchases, hiring student researchers, or other costs that would be incurred by the teams.

Monthly All-Hands Meetings—in which all participants from all teams would be present, and which lasted one hour—began on May 19th, 2021 to facilitate inter-team connections, with all but one conducted via Zoom. Additionally, monthly team meetings, which also lasted one hour and were conducted by Zoom, were scheduled with each of the teams to facilitate the completion of the deliverables. We balanced between being facilitators, participants and observers within in these meetings. This helped us obtain an ethnographic level of detail on the interactions between the collaborators (Bernard, 2011: 260-264). Detailed notes were taken during each of these meetings and summaries were shared with all the collaborators. Occasionally we would record these meetings and transcripts were prepared for analysis. We discuss some of these meetings below in more detail.

Initial semi-structured interviews were conducted with all of the participants (six community group leaders and 11 academics; *n* = 17; see Appendix A; three academics were on two teams)[3] at the beginning of the collaboration. We included questions that were directly related to the participant's personal background, their experience with collaboration and addressing issues of environmental injustice. Interviews were conducted and recorded via Zoom.

Following a close analysis of the initial interviews as well as the ongoing discussions in the All-Hands and Monthly Team Meetings, we designed a follow-up interview protocol that aimed to answer remaining gaps of information that would support our analysis. This included questions about the importance of the social impact of research, the meaning and value of collaboration, and changes of participants' views on collaboration. As some collaborators had withdrawn due to time conflicts, we conducted 13 follow-up interviews[4] with all remaining participants, which were recorded through Zoom. We drew upon a qualitative data analytical approach to explore the major themes that emerged from the interviews (Miles et al., 2014). This analytical approach has resonance with grounded theory (Strauss and Corbin, 1998) approaches in STS because it guides us towards concepts used by "the agents under study" (Fuller, 2006: 49).

In the following sections we will explore the way the teams experienced collaboration through their responses during interviews as well as analysis of discourse and observations of interactions within the meetings.

Motivating and facilitating collaboration: Funding, time, and the currency of collaboration

Through our observations and interviews we discovered that an important part of the experience of collaboration is team formation and that often hinges on what motivated each individual collaborator to become part of a team, and what facilitates collaboration. This included topics that are familiar issues in collaboration: funding and time. For instance, our interview with an Assistant Professor of Sustainable Engineering at Arizona State University (ASU) provides a good example of one aspect that facilitated her collaboration with OCLC during Project Confluence. When we asked her what she felt moved her relationship forward in their collaboration, she replied:

> So, I think it's always easier for me when there's funding involved. Because for me funding is equivalent to responsibility, because that's just how engineering is…we do our work based on funding. Unfortunately, I don't really have time to do things that I don't have money for. There are lots of things I would love to do but don't have time for.

Fundraising is considered critical to one's success within engineering disciplines in the field of academia. At the same time, as with other pressing social challenges, within the environmental justice world and the field of community group work, funding and time are important examples of what facilitates collaboration. When we asked the Executive Director of OCLC, who is also a retired

elementary school principal, how academic work is valued in collaborations he said:

> Well, I think everything should be compensated in some way. Because just plain volunteering…I mean that's what I do. My life is volunteer now. But it's not sustainable for making change. So there needs to be compensation. But ultimately the thing that we need to be confronting is the capitalist way of compensating. We need social enterprise, cooperatives and hyperlocal economies.

In other words, while money is necessary for collaboration, that does not mean a collaboration has to be organised in a corporate or even a capitalistic manner. While some are already concerned about how corporations might be appropriating the work done within collaborations (Blacker et al., 2021), alternative models for financing this collaborative labour needs to be considered. For instance, Sandy Smith-Nonini (2016) reflects on the balance she needed between research and activism that led her to establish a social enterprise for creative reuse called Eco-Cycle. Eco-Cycle also faced a number of financial challenges to ensure those involved in the collaboration could receive proper compensation for their time.

This then raises an additional question about the kind of timeframe that collaborations can integrate into their strategy. Some environmental justice issues are more urgent than others and that sense of urgency can act as a prime motivator. For instance, the AFN team needed to find a better way to coordinate the organisation of cooling centres as quickly as possible because people are dying every year during heatwaves in the region (Iverson et al., 2020). In contrast, the digital platform for engaging with trees was conceptualised some time ago by the Executive Director of Trees Matter, but before joining Project Confluence it was not something the community group felt needed to be done right away.

An academic collaborator with Trees Matter is a Professor of Practice with expertise in citizen science at ASU and she compared the importance of time for community groups with the way that academics tend to approach time in science. When we asked her what she found odd about the way academia operates she mentioned that for most academics it "seems like time doesn't matter much", but for community groups:

> There's a sense of urgency with the smaller organisations…the mission of what they're doing, it can't wait. It doesn't have 10 years. They don't have that luxury of being unconcerned with time and getting things done.

Other researchers have demonstrated how different timeframes of funding agencies, academics, and community members can create serious barriers for projects like urban gardens that otherwise can have a transformative impact on local issues of environmental justice (Kotsila et al., 2020). So, time is a facilitator for collaboration in the sense that if time availability is not well balanced among collaborators it can negatively affect the outcome of a collaboration.

That last quote also touched what we discovered to be the most important motivator for collaboration, which is the desire to be doing things or as the Professor of Practice put it "getting things done". Although in our initial interviews we did not ask a question specifically about why Project Confluence participants wanted to join a collaboration, we discovered a similar theme across a variety of responses: that the collaborators within Project Confluence had self-selected to participate because of a desire to make their professional work relevant to a local community. This finding is similar to the commitment found among DIY Makers communities engaged in environmental projects described by Berglund and Kohtala (2020). Others have described the desire for academics interested in collaboration and being more connected to society and local community groups as 'research altruism' (Carrera et al., 2018).

During one line of questioning about what was unique about the Project Confluence approach, the Director for Data Science and Analytics in the ASU library described to us a concept that we find central to understanding the facilitation of individual collaborators: the "currency of collaboration". His job is to help faculty and students from the humanities, social sciences and engineering obtain the computational resources and knowledge they need to conduct analysis on complex organisations, social media, and linguistics. At the very end of the initial interview conducted with him in April 2021, he posed this idea to us as such:

> I'm in a really non-traditional position: I have a faculty appointment, but I'm also in the library. So, I don't have the same requirement as a research faculty member would have to sponsor their salary through grants. And that means their incentive structure is to apply for grants. Tenure-track faculty are evaluated on their publication record, so they're incentivised to publish articles. I am personally and professionally incentivised to help people. So, [working with Project Confluence] I feel like the currency of collaboration, for me, is…collaborating! That I get to do this is a good thing for me. But I can't pretend it would be simple to try to balance folks who have one currency of collaboration against so many others where money, publications, and reputation are all bouncing around.

The concept of 'currency' opened up our analysis for considering what facilitates collaboration and what that can mean for science in general. In this sense, currency could be thought of as the kind of social and academic capital that could structure a future field of collaboration for addressing issues of environmental justice (Boucher et al., 2020). Additionally, currencies of collaboration can help explain the potential for tension that Jalbert et al. (2021) described for academics engaging with citizen concerns about helium extraction in Arizona. In that case, the relationship building that was necessary to ensure a successful collaboration did not always fit well with the need for the academics to publish peer-reviewed articles based on their research.

Throughout our study, we found that the currency of collaboration was often tied to a motivation for 'doing things' for the community. Here for instance is what one Assistant Professor of Civil and Environmental Engineering at the University of California-Merced[5] said when we asked him to describe his work as an academic:

> Well, actually that was one of the things I found most exciting about Project Confluence. For a little while now, I've recognised there is a disconnect between my work and stuff on the ground…I can have a good idea of what the key issues and problems are, and I can model it, but I think I need a stronger feedback to the people that are actually on the ground. Especially since my work is related to cities and infrastructure, these are things that people are interacting with and using on a day-to-day basis. Trying to find a way to have a stronger community or co-production element is something that moving forward is a key area for me to develop.

The academics who participated in Project Confluence described their interest in collaboration using very similar framings about co-production and providing research that benefits people "actually on the ground", which could be interpreted as a form of 'research altruism' (Carrera et al., 2018).

The interest in putting science to work to 'do things' ties together the examples that emerged from our interviews, which fits very neatly into the STS analytical frame of "making and doing" (Downey and Zuiderent-Jerak, 2016). For instance, when we asked the project manager from Trees Matter about how the work done by community groups is valued in collaborations, she said:

> The mutual benefit obviously for us is getting the knowledge and the know how that we honestly would have to contract out otherwise. So, that's very valuable for us…[Academics] need to have a connection to the real world…if they need that connection that's something that we can provide…the thing of interest is definitely to be able to see the research used in an applied real-life setting.

It is important to note the institutional context provided by ASU because it influences how academics engage in their disciplines. ASU's charter states,

> ASU is a comprehensive public research university, measured not by whom it excludes, but by whom it includes and how they succeed; *advancing research and discovery of public value; and assuming fundamental responsibility for the economic, social, cultural and overall health of the communities it serves* (emphasis added).

The fields within which the academics at ASU work are shaped by the charter and thus can help explain their interest in academic work that benefits people. The fact that 'doing things' was so central to collaboration, however, was not so obvious to everyone right from the start, least of all academics who also face a currency of collaboration that emphasises research that may drive an academic field forward rather than creating

knowledge for accomplishing a socially-relevant task. In the next section we will explore how the experience of collaboration guided collaborators towards a shared understanding that collaboration as a form of community science was about 'doing things' rather than 'conceptualising research questions'.

Reaching a shared understanding of collaboration

In our introduction, the project manager at Trees Matter provided us with a fun food metaphor for considering how diverse individuals from community groups and academics labour together within a collaboration. Directly after providing us with that metaphor, she said:

> In more professional terms, collaboration is bringing together several different individuals that have different talents, networks and resources, and then trying to create a product or an outcome from the combination of those resources.

We see that collaboration is about 'creating a product' rather than asking a research question to obtain more knowledge. However, this definition was also provided to us after the members of the Trees Matter team had spent six months labouring together. There was a process where the idea of what they were doing within the collaboration became clearer to everyone on the team. We frame this as a moment of a change in understanding and a process of reaching a shared understanding about what collaboration meant to the team. While we know that diversity within a team can often stimulate opportunities for obtaining new understandings and greater equity across groups (Bang and Vossoughi, 2016), our ability to see a change in understanding take place during the integrating of different viewpoints and approaches is difficult, as it could occur during any stage of a collaboration. Hall and Horn (2012) were able to demonstrate that this kind of change was occurring when collaborative production was suspended while participants debated a point of contention in their labour. Because a change in understanding is more visible in the midst of contention, it is important for us to explore in detail two ethnographic moments that led to a shared understanding of how collaboration came to mean 'doing things' to the teams.

"Do we just pull the trigger?"[6]

A first example comes from the Trees Matter team during a monthly team meeting on August 20th, 2021, which included the Executive Director of Trees Matter, the project manager of Trees Matter, the Professor of Practice with expertise in citizen science from ASU and a research librarian also with expertise in citizen science from ASU. The team was trying to complete their first deliverable, the MOC. But across multiple previous meetings they had struggled to articulate how the goal of the collaboration would emerge from their CCA: while they knew the desired long-term goal would be a digital platform for helping community members engage more with trees in Phoenix and beyond, they were not quite sure what they would do in the following months that would contribute towards that product. At this point in the meeting, the team had been working for about 35 minutes on detailing what the milestones in their project would be and then who would be responsible for implementing each step. But there was still a lack of clarity on the purpose of the CCA, which is when the Research Librarian on the team said, "I think a problem is that in these meetings we keep getting distracted with starting and stopping conversations, and we just gotta keep it moving a bit".

This statement led to a long pause within the group. There was a palpable tension because everyone was now reflecting on whether the conversation was heading in the right direction. No one wanted to feel like they were wasting anyone's time, which created a moment of contention. The Executive Director then returned to a topic where it appeared everyone agreed:

> *Executive Director*: So just to come back to this point again, I want to make sure we are all on the same page that the CCA should be a pitch?
>
> *Project Manager*: Agreed, it makes sense.
>
> *Research Librarian*: Working with the elementary school might also be good in this regard, especially if you are ever interested in pitching to other schools or pitching ideas to parks departments. It sounds like a goal to me.

Now at this point the team was at least on surer footing. There had now been verbal consent that a pitch was the right way forward. An opening had been made for the participants to explain their own thinking on how they typically approach problems in their work.

Directly after this the Executive Director continued by explaining how community groups typically operate:

> *Executive Director*: Some community groups are ready to do implementation. We usually do the implementation. But here in Project Confluence we have the opportunity to think through that implementation first and make it as useful as it can be.
>
> *Professor of Practice*: Just as an aside, it might be interesting to think about what would happen without us academics involved.
>
> *Project Manager*: Well, usually we are more action-oriented. You learn on the way. It is a bit like learning to build an airplane while flying.

This period of consultation within the team regarding what it was that they planned to do in the collaboration helped the academics understand the expectations of the community group organisers. Although this moment was slightly awkward, it gave the organisers the space to clarify how the community group was typically focused on 'doing things', and that they also understood how the collaboration could give them the opportunity to conceptualise their project before jumping into implementing it. Thus, the team changed from a poorly articulated understanding of collaboration to a shared understanding that their collaboration could focus on 'doing things'. They were then able to quickly organise their milestones and end the meeting. Everyone agreed to meet the following week to finish writing the MOC.

At this second meeting, they began right away reflecting upon this moment of a change in understanding that occurred the week before:

> *Research Librarian*: Last week, I remember hearing Trees Matter saying they were not used to working in this way, they were used to just going…We've identified the need. Do we just pull the trigger?
>
> *Project Manager*: Well, we are not going to build the platform now. But there are definitely action items in the MOC. It feels like a roundabout way to do things. I'm ready to go. I want to collaborate.
>
> *Executive Director*: Maybe we can just work on the milestones.
>
> *Project Manager*: Yeah, we have had many meetings about it, maybe we just do it.

Now we can see that the team has reached a shared understanding of what collaboration is about in the context of their environmental justice challenge. This allows everyone to feel comfortable about "pulling the trigger" rather than being too concerned with conceptualising a plan or research questions. The project manager was able to explain that even the conceptualising that went into the MOC was a roundabout way to do things.

While it would appear in this case that the Trees Matter team was strongly influenced by the way community groups operate, it is also true that this change in understanding influenced individuals like the project manager by making them more aware of how academics operate. In her follow-up interview, while reflecting on the moments when her understanding of collaboration changed during Project Confluence, the project manager informed us that:

> I realised, Okay, I'm still trying to use the mindset that I usually use. That was probably the meeting right before we set deadlines for our milestones. After I realised that this was a different style of collaboration than we are usually in, it was a lot easier to facilitate and move forward with the project after that.

So, while the collaboration became more about 'doing things', which was closer to the project manager's understanding of collaboration, it was after the team arrived at a shared understanding among all the collaborators that their collaboration became "easier to facilitate and move forward". Thus, the experience of collaboration is one of reaching a shared understanding in order for the collective to move beyond the assumptions and expectations held by the diverse individuals within the team. In this case it landed the team comfortably where 'doing things' was

more important than 'conceptualising research questions'.

"Let's just go do it"

This is not to say that once a team reaches a shared understanding of collaboration focused on 'doing things' that they will no longer be affected by academic concerns. This became quite obvious during another moment of a change in understanding for the AFN team. While working on their CCA, the team discovered that they would like to conduct interviews with managers of cooling centres in vulnerable communities across the United States. They wanted to discover what kind of diverse management practices were being used that may or may not be dependent upon faith-based organisations. To conduct these interviews, they hired a Public Administration graduate student at ASU who had worked with the Executive Director of AFN and an Assistant Research Professor of Sustainability at ASU during the summer of 2021. The graduate student had done similar interviewing before as an undergraduate student and felt comfortable preparing the materials for the ASU Institutional Review Board (IRB), which approves human subjects research.

On Dec. 2nd, 2021, during a monthly meeting to discuss details about submitting materials to the IRB, we observed a change in understanding occur within the AFN team. As the meeting began, the graduate student explained that after the revisions were completed, there was a miscommunication with the professor that led to a delay in the materials getting submitted to the IRB. At this point, the Executive Director stimulated an important discussion by asking:

> *Executive Director*: Is there even a need to do an IRB if we are not planning on publishing our results?
>
> *Graduate Student*: Well, overall IRB is an ethical review that is important for any social science project to undergo so that we ensure the human subjects within our study will not be harmed in any way.
>
> *Executive Director*: Absolutely, I understand the important role they play. But if we know for certain that the research will have a benefit to a vulnerable community and won't harm those we study…I mean in the NGO world we would say "let's just go do it".
>
> *Assistant Research Professor*: Yes, I appreciate your enthusiasm. At the same time, if we want the government to pay attention to us, then we need an IRB and we need a paper.

A degree of contention was felt over the necessity of engaging with an IRB in the process of trying to support the needs of vulnerable communities during a heatwave. The problematic nature of IRBs and informed consent have long been discussed by fieldworkers (Lederman, 2006; Bell, 2014), which reflects the Executive Director's concern that an ethical review may not be expedient if it prevents vulnerable communities from benefiting from their research; within the field of community group work, IRBs are not necessary. The assistant research professor, however, brings the norms of academia to bear on the topic by arguing that their research will have more legitimacy and more potential to stimulate change if they can publish a paper, which cannot be done without submitting materials to an IRB. Demonstrating a change in understanding, the Executive Director then said, "That makes sense because I understand people can learn from our paper in the future and it gives our recommendations more authority. And will these interviews help us explain to the government what is needed to support cooling centres in Phoenix, whether that be a new NGO or something else?"

During this change in understanding, the Executive Director is acquiescing to the important role that academic infrastructures, such as IRB and peer-reviewed publishing, can play within a collaboration. Note, however, that this ethnographic moment is not about obtaining IRB approval to conduct interviews simply to answer a research question. Ultimately, the interviews are important to influence the creation (or not) of a new specialised NGO that can support cooling-centres in Phoenix. The peer-reviewed publication is to influence the government to change their policy. This moment of a change in understanding has still led the team towards 'doing things', and research questions that could influence the interviews have faded into the background of this discussion.

It is also worth exploring how this moment of a change in understanding was explained by the Executive Director to all of the Project Confluence participants during an All-Hands Meeting on December 8th, 2021.

> Last week, we didn't even work on the CCA that much because we were…trying to figure out how to address this issue about the IRB. I definitely gave the feedback that this process is ridiculous if we're actually trying to prevent people from dying. And while I could see on some level that it is needed and I'm glad we did it…I was asking the question of how long is this going to take. Because at the end of the day, as community-based organisations that are trying to respond to immediate community needs, if we're going to be spending four months waiting for some stuffy old committee to give their rubber stamp of approval so we can ask the dang questions to get the data that we need to actually prevent people from getting sick or dying next summer…I'm going to just say…forget it. Let's go do what we need to do.

The Executive Director emphasised that the need for community groups to focus on the day-to-day level of urgency that their small organisation faces forces them to centre their activities upon 'doing things'. The academic institutions of IRB and peer-review were designed primarily within the field of academia where 'conceptualising research questions' is the dominant approach, which potentially makes those institutions inadequate for a science that is focused on 'doing things'.

This exchange highlights how the tension over IRB and peer-review publishing led to a change in understanding within the AFN team's collaboration that refocused their efforts upon 'doing things'. It also points out, though, that academic institutions can return to influence collaboration even if they appear to be operating along the norms of a community group. This raises a point about how or where conceptualisation and research questions might play a role in these collaborations. In fact, right after the Executive Director raised her question about how much data they are missing out on, the engineering professor from University of California-Merced spoke up with this point by drawing upon the AFN team's experience:

> I agree that the interviews currently are our main scientific motor. But I think…interview results will point us in the direction of some additional scientific measurements or data that could be collected. So, just based on, for example, some of the questions that we asked the respondents to indicate what information would be helpful or what improvements would they like to see and how their cooling centres are administered…I think the answers could steer us in a good direction for saying, for instance, "Okay, we need to go measure heat vulnerability in these populations". So, there are a few potential avenues for addressing future questions that I can see emerging already.

Thus, the engineering professor opened up a new role for research questions—a key aspect of conducting academic work regardless of discipline—not as a frame for collaboration but rather as an outcome. In the following section we further explore the role research questions might play within collaboration.

New questions for collaboration

As noted above, within the AFN team's collaboration the research questions came later rather than being the overarching framing for their project. This was echoed by an engineering professor in her collaboration with the OCLC team:

> I think just actually being able to do something together, like breaking ground on the project and getting the designs going, just the act of doing instead of talking about doing something, I guess was good. And, you know, that led to more research questions.

It is important to emphasise that during the OCLC team's experience with collaboration, there was not really a specific moment where conceptualising research questions around the irrigation system occurred. Instead, the designing was happening nearly simultaneously while they were digging the lines where the irrigation pipes would be buried. When one of us visited the urban farm, OCLC's Executive Director mentioned that the lines they were digging followed the experience of local farmers. The OCLC team essentially asked the farmers where the best place to put an irrigation line would be, then they would take measure-

ments and each time they would confirm from an engineering perspective that the farmers were right. By March 2022, they could see the results with farmers getting better access to water. But new questions arose about water retention and changes to soil quality. Thus, while the OCLC team, more than any other team, was initially wholly focused upon 'doing things' and were constructing the irrigation system while designing it (in the spirit of the "building an airplane while flying" metaphor), the end of the collaboration centred upon new questions that only became significant through the process of implementing their project.

However, collaborators' experience with 'conceptualising research questions' was not necessarily something that was limited to just wrapping up their project. Within the AFN team, 'conceptualising research questions' was often an opportunity for collaborators to reflect on the positionality of academia in relationship to the community. For instance, when we asked AFN's Executive Director how collaboration might change the way research questions are conceptualised, she said:

> I think the value of a community-based organisation is that we have the connections and we're doing the work in real time outside of the classroom and research lab….I think your questions totally change when you meet someone who's experiencing the problem you're studying…So there's that bridge building that I think is essential to answer the questions that are there…and connecting to that lived experience reforms the questions that would be asked.

As a community group leader, she sees herself as a bridge between the community and the science that is conducted in the collaboration. The process of collaboration therefore forces a re-conceptualisation of research questions as the academics build relationships with the community through the community group. The Executive Director mentioned to us that a severe challenge is that both academics and government officials who were concerned about the impact of heatwaves on the vulnerable communities of Phoenix had probably never visited one of the faith-based cooling centres. Without this hands-on experience, any scientific data these academics collect or analyse might not be relevant to the community that would benefit the most from such research.

The experience of collaboration for the Trees Matter team led them towards a slightly different perspective, which problematises a typical assumption that 'conceptualising research questions' tends to be for the purpose of expanding our limits of theoretical knowledge. For instance, when we asked the project manager for Trees Matter about how collaboration can change the conceptualisation of research questions, she replied:

> I think it takes the research questions outside of the realm of the theoretical and into the practical. So, instead of asking things like "how much carbon does the whole urban forest of Phoenix take out of the air?"…you could think "how much better is the air quality around the school if we plant five trees?"

For her, the latter type of research question is more specific and tailored to the needs of the community, an essential aspect of the field of community group work. Her point, however, is that collaboration provides us with the space to conceptualise a research question that is more practical and beneficial to the community. And when we asked the Professor of Practice with expertise in citizen science from ASU that same question, she gave a similar response:

> From the university's standpoint, too often we see the community group not as a collaborator, but as a way to broaden our outreach and impact… that has been extremely damaging to the trust with community groups and different populations in terms of them being willing to work with universities in that role. Usually, I don't see that coming the other way, where the community group is reaching out to a university. So, if there were ways to standardise and normalise this period of time for trust building negotiations, just working out mutually beneficial research questions, and that the time was funded for people to actually prioritise and think through it…I think that could be a game changer in terms of how we conceptualise research questions.

This is an important formulation of how 'conceptualising research questions' could work in collaborations, a formulation that reflects on how the

field of academia has historically engaged poorly with communities. However, here the Professor of Practice has returned the discussion back to the facilitators of collaboration. She is noting that if the money is there to support the time it takes to build trust within collaborations, then it might be possible to conceptualise research questions that are mutually beneficial to both academics and community groups. Within such a framing, collaboration with a community group is no longer just about disseminating science from academia to a community, rather it is about 'doing things' by conceptualising research questions in a way that adds practical value to issues the community wants to address.

Exploring the distinction between 'doing things' and 'conceptualising research questions' across the Project Confluence teams helps clarify that this distinction is not necessarily connected with the cycle of deductive-inductive approaches to science. There could be confusion for the reader that the way we are describing 'doing things' simply refers to an inductive approach to science, where new research questions are conceptualised after data collection and analysis. While that did occur within the OCLC team, that is not what we are documenting through our study of the collaborations in Project Confluence. Rather we are demonstrating that 'doing things' is more akin to common sense, situated knowledge, or perhaps mêtis (Geertz, 1975; Haraway, 1988; Scott, 1998), all of which involve the concrete accumulation of knowledge through practice and experience allowing people to address a diverse range of challenges. These forms of knowledge are typically contrasted with the rote knowledge associated with Aristole's concepts of episteme and techne, the "theoretical know why and… technical know-how" (Flyvbjerg, 2001: 56) respectively. It is often assumed that scientists approach issues of episteme and techne by first conceptualising a research question. However, after reviewing the experiences of the teams within Project Confluence, it is worth questioning how these distinctions between rote knowledge and situated knowledge can be reconfigured within environmental justice collaborations.

Discussion: Conceptualising doing things

> The framing is almost always: Well you're either doing it as a passion project or you're doing it because somebody is already funding it with an external grant. …You know why? It's an odd thing but compensation for the ideation and the negotiations of the social dynamics, the trust building is hard…There's a lot of hard work put into it, then you write a proposal together and you're compensated later…We are always constantly chasing after proposals that don't think through these aspects of it first.

This was the response the Professor of Practice with expertise in citizen science from ASU gave when we asked her how the work done by the community group is valued within collaborations. It is an ideal quote for tying the pieces we have discussed in this paper together. As we have noted, an interest in 'doing things' was a motivator within Project Confluence, but it wasn't always an obvious one. Money was also necessary as a facilitator so that the groups could be compensated for the ideation process that would lead to 'doing things'. Moreover, it is during that ideation process that a change in understanding occurred allowing the team to come to a shared understanding that collaboration is about 'doing things'. In general, this process would be done volunteer or *pro bono*. The team is dependent on applying for a grant that might recoup their costs, often from a scientific foundation or government agency that still operates on the assumption that science is about 'conceptualising research questions' rather than 'doing things'. This also means that the structure of such grants provides tenured and tenure-track academics as well as university research staff with an advantage: their labour in creating a proposal is offset and guaranteed through the university. Thus, it may be necessary for funding agencies to consider alternative opportunities that support community groups and ensures a shared understanding can develop within collaborations during the earliest phases of the project.

The issues affecting collaboration that we discovered during Project Confluence go beyond the potential limitations of money as

a facilitator of collaboration because they also reflect on the structural differences that exist between community groups and academics. For instance, the purpose of the community groups we recruited to Project Confluence is to provide services to their communities. This is primarily done through the implementation of projects, which can of course be informed by science. For community groups trying to address environmental justice there is also often a sense of urgency that was described by the Professor of Practice with expertise in citizen science at ASU and the Executive Director of AFN. This explains why there is a strong emphasis on 'doing things' among the community groups in Project Confluence. In contrast, academics are trained to engage in planning and frame their science through theory. Typically, they also desire to gather together a holistic understanding through their work, which is why academics are more inclined to focus on 'conceptualising research questions', but all of this can take time.

An important argument can be made regarding the need for conceptualisation and the role that academics can and should play in addressing environmental justice through collaboration. The urgency that community groups face means that their project-based approach requires a hyperlocal focus. While this is what is needed to support the vulnerable communities these organisations represent, it simultaneously can prevent them from being able to address the systemic inequities at the heart of environmental justice. This is where academics can play a role. When academics are provided the space for conceptualisation, they can innovate in ways that ensure long-term solutions can be found to resolve the social inequities at the heart of environmental injustice. Moreover, this conceptualisation does not need to take place in a vacuum. As the project manager at Trees Matter noted above, collaborations provide academics the ability to engage not just with community groups, but also directly with the community. All of the academic collaborators in Project Confluence were motivated to make engagement with the community a central part of their labour, demonstrating that today there is a significant recognition that academics can—and should—act in the public interest (O'Brien, 1993). Thus, through collaboration, academics can use their skills in theorisation and conceptualisation in a way that ensures the outcome of their scientific approach is beneficial for the vulnerable members of the community most affected by issues of environmental injustice.

One of the reasons collaborations struggle to frame this kind of research and require time to reach a point where there is a shared understanding of collaboration among everyone within a team is because we do not have the language we need to structure these discussions. We need a name for the way the experience of collaborations merges what academics and community groups do best. We offer up 'conceptualising doing things'. We discovered that even when we asked our interlocutors about how collaboration might change the way they ask research questions they pointed out that such questions would become more practical and grounded to the community. Thus, our use of 'doing things' is a summation of statements from Project Confluence collaborators, like "getting things done" and "building an airplane while flying", that carries an implicit prepositional phrase: 'doing things [for the community]'. This implicit understanding is essential for framing 'conceptualising doing things' and for distinguishing it from other approaches of applied science and STS interventions (Zuiderent-Jerak and Jensen, 2007; Bickman and Rog, 2009). In this sense it has a closer affinity with the way STS scholars have explored 'making and doing' (Downey and Zuiderent-Jerak, 2016) and encompasses the kind of 'research altruism' (Carrera et al. 2018) that we found motivated individuals in Project Confluence. There are also examples of 'conceptualising doing things' in case studies from classroom settings, such as when students are taught to use DIY sensors to demonstrate the impacts of environmental injustice in the local community near their university (Kenny et al., 2019).

'Conceptualising doing things' operates on a continuum rather than an absolute. This is obvious from the three collaborations we have outlined here. The OCLC team was able to focus entirely on project implementation during their collaboration and only began to theorise towards the end of the project. The AFN team had an urgent need to

Table 2. Matrix of 'conceptualising doing things' and the results of Project Confluence

		Contribution of Academic Partners		
		Implementation	*Balanced*	*Theorisation*
Mission of Community Group Members	*Implementation*	OCLC Team	AFN Team	
	Balanced		Trees Matter Team	
	Theorisation			

establish a new community group for managing cooling centres, but also wanted to analyse interviews to sketch out what that new organisation might look like. The Trees Matter team in contrast saw this as an opportunity to refine an idea they had for designing a digital platform that would encourage people to share their experiences with trees in their neighbourhood. Thus, there is a mixture of implementation and theorising that can emerge from 'conceptualising doing things' and a collaboration can place more or less emphasis on either. It is also true that some academics may feel more comfortable with implementation or theorising than others; and the same could be true for those working in community groups. With this in mind, the make-up of a team could potentially be balanced depending on whether the challenge that a community group intends to address requires more theory or more implementation. We could imagine a grid where the continuum of 'conceptualising doing things' intersects at the confluence of the strengths of academics and community groups (Table 2).

While none of the projects in Project Confluence began 'conceptualising doing things' with research questions, we can imagine collaborations that require greater degrees of theorisation and could be organised by tweaking the model of knowledge creation to move an academic field forward and converting it into knowledge creation to address an important social issue. Thus, future research can attempt to fill out an understanding of how diverse collaborations operate across the *matrix of 'conceptualising doing things'*. For STS researchers, this would be an important step in interpreting a field of collaboration for addressing issues of environmental injustice (Boucher et al., 2020) because it would allow us to better understand how forms of social, economic and intellectual capital can be brought to bear on different types of collaborations.

Conclusion

The open-ended and qualitative approach of Project Confluence led us to discover that collaboration can be about 'conceptualising doing things', providing us with a matrix of possibilities for collaborations to consider along a spectrum of implementation and theorisation. Moreover, we found that research questions could still emerge and become important at different stages of a collaboration. The process of 'doing things' opened up space to conceptualise new questions that had yet to be asked within the collaborations. Thus, collaboration can challenge our assumptions of how science operates when our research is focused on issues that need addressing *now*.

Much as Hess (2013) understood that sociological field theory is the proper theory for exploring the relationship between neoliberalism and science, so too is it the appropriate frame for understanding the relationship between environmental justice and science. The political ideology that informs environmental justice provides the academic field with the kinds of capital it needs to support pluralist working styles that "seeks diversity and inclusion and a celebration of different perspectives" (Halfon and Sovacool, 2022: 20). At the same time, a field sociology approach helps ensure that we do not fall into the same problems that faced the short-lived interests-based concern that social structure can explain everything. As we have tried to show, the meaning being the 'currency of collaboration' also plays an important role in guiding the accumulation of social capital for our informants. We also need to recognise that the goal of collaborations is quite different than the concern for credit that was at the heart of Mertonian functionalism (Merton, 1973) and Marxian interests scholars (MacKenzie, 1978). Within the field of community science the focus is upon using science to improve the welfare of the people living within the collab-

orators' communities. Thus, again, field theory helps us make the theoretical connections to the extra field of community that is so intimately tied to the way science is understood and practiced by our informants.

While in theory the scientific method is perceived by scientists to have a particular structure and order, in practice this process is messy. This messiness has almost become a truism within STS that leads some scholars to be unapologetic for the way their interpretations might enable an anti-science discourse, such as around climate change (e.g. Fuller, 2017). However, one point that is often lost amidst claims about how science operates is that when engaging in collaboration, the experience of either the supposed structure or messiness of science becomes mere background noise. The act of collaboration, either implementing a project or conceptualising a new research question, can bring meaning both to one's own life and a shared meaning across one's team. For collaborators, there is also the foregrounding of trying to reach a shared understanding through which a change in understanding can occur, while the concerns with the messiness and structure of science fall away from their focus. Some have even called this process and experience of reaching a shared understanding through debate fun (Graeber, 2014). Julia Wondolleck and Steven Yaffee's seminal work on collaboration in fact argues that while the teams they studied were undoubtedly working hard to address issues of natural resource degradation, the successful projects "were having fun at the same time" (Wondolleck and Yaffee, 2000: 168).

Of course, collaboration is also serious; everyone in Project Confluence was, after all, discussing how to address environmental injustice. Addressing environmental injustice through collaboration produces a specific form of "shared experience of a danger made real" that encourages us to "develop language and claims and demands and stories that represent our particular fate, in order to narrate that experience of being an instance of a particular collectivity of suffering" (Kelty, 2019: 84). In that sense, community science for addressing environmental injustice should not only be described in terms of its structure or its messiness. Rather collaboration can be about experiencing serious fun while labouring together in a way that will bring benefit to the community as collaborators surpass their individual understandings of science and form a collective dedicated to addressing a shared experience of suffering.

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Notes

1 To protect our informant's privacy, we have anonymised the names of individuals within the collaborations discussed in this article.

2 Although engineering and other technical work had an important place within these collaborations, for clarity we will collectively refer to all work as 'scientific' work, and aggregate both of these activities into discussions of 'science' throughout the article.

3 For the initial interviews, for the Arizona Faith Network team, we interviewed one community group leader and four academics; for the Trees Matter team, we interviewed two community group leaders and three academics; for the OCLC team, we interviewed one community group leader and three academics; and for the Indigenous Vision team, we interviewed two community group leaders and four academics. Note again that three academics were on two teams, and thus, the total number of initial interviews was 17.

4 For the follow-up interviews, for the Arizona Faith Network team, we interviewed one community group leader and three academics; for the Trees Matter team, we interviewed two community group leaders and two academics; and for the OCLC team, we interviewed one community group leader and three academics. The Indigenous Vision team disbanded, and one of the academics that was on two teams had to stop participating because of a job change.

5 When the Project Confluence research project was started, this participant was employed at ASU. Part-way through the project, they moved to the University of California-Merced.

6 In colloquial American English, "pulling the trigger" means to start taking action to do something.

Appendix A: Project Confluence | Final Teams

Team and challenge identified	Team member	Expertise	Previous collaboration experience
Arizona Faith Network: Design a coalition to coordinate faith-based cooling centres in response to the extreme heat events	Executive Manager, Arizona Faith Network	interfaith dialogue and theology, facilitation, conflict resolution, organizational design, non-profit management	No previous collaborative experience with scientists or engineers
	Assistant Research Professor, Sustainability, ASU	adaptation, equity, vulnerability, urban policy, and governance for the mitigation and adaptation to extreme heat and urban heat island effects	Collaborated with community groups and local government to address urban heat issues
	Assistant Professor, Department of Civil and Environmental Engineering, UC-Merced*	sustainability and resilience of urban and infrastructure systems, climate change mitigation and adaptation, social-ecological-technological systems; risk analysis under uncertainty	No previous collaborative experience with community groups
	Graduate student, ASU	Public policy, psychology, community support for vulnerable and homeless populations	Collaborated with community groups to address heat and homelessness
	Asst. Director, University Sustainability Practices, ASU	sustainability program design, operations, and management	Worked in an environmental justice advocacy community group
Trees Matter: Create a digital platform through which the general public can interact with their local canopy.	Executive Director, Trees Matter	geography, environmental policy, certified arborist	Is a professional arborist working in a community group
	Program Manager, Trees Matter	sustainability, community organization	Collaborated once with geospatial scientists, regular collaboration with arborists
	Librarian, ASU	citizen science, government information	Regular collaboration with community groups through digital citizen science platform
	Asst. Director, University Sustainability Practices, ASU	sustainability program design, operations, and management	Worked in an environmental justice advocacy community group
	Professor of Practice, College of Global Futures, ASU	citizen science and participation	Regular collaboration with community groups through digital citizen science platform
Orchard Community Learning Center: Develop an efficient irrigation system design for improved water resources management at the Spaces of Opportunity community farm and incubator.	Executive Director, OCLC	farm-to-table food, STEAM education, elementary and bilingual education	Regular collaboration with scientists on the board of OCLC and Spaces of Opportunity
	Assistant Professor, Sustainable Engineering, Ira A. Fulton Schools of Engineering, ASU	watershed modeling, surface hydrology, water quality, agricultural ecosystems, evaluating impact of land management decisions within the food-energy-water nexus	Engagement with rural stakeholders and community groups representing rural stakeholders
	Undergraduate student	environmental engineering	No previous collaborative experience with community groups
	Undergraduate student	environmental engineering	No previous collaborative experience with community groups
Indigenous Vision: Building a map and database of pollution/land degradation on Indigenous land in North America	Senior leader, Indigenous Vision	water quality, mining contamination clean-up, and water-treatment	Is an environmental scientist working in a community group
	Senior leader, Indigenous Vision	American Indian studies, geography, facilitation, cultural humility	Collaborates regularly with geospatial scientists
	Assistant Professor, College of Global Futures, ASU	environmental justice, science and society, energy policy	Direct engagement with community groups and tribal representatives during research
	Director for Data Science and Analytics, ASU	data science and visualization, human-technology network analysis, collaborations that bridge environmental sciences and humanities.	Once collaborated with a community group to organize a display of a local writer's papers
	Professor of Practice, College of Global Futures, ASU	citizen science and participation	Regular collaboration with community groups through digital citizen science platform
	Assistant Professor, Department of Civil and Environmental Engineering, UC-Merced*	sustainability and resilience of urban and infrastructure systems, climate change mitigation and adaptation, social-ecological-technological systems; risk analysis under uncertainty	No previous collaborative experience with community groups

Standardising Patient Engagement in Drug Development: The Emerging, yet Already Noteworthy Case of Patient Focused Medicines Development (PFMD) and its Materials

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Abstract

Initiatives to increase patient engagement in drug development have recently been accompanied by growing calls for standardisation due to considerable uncertainties about how to best perform patient engagement and use it in drug marketing applications. We focus on materials developed by the Patient Focused Medicines Development (PFMD), a multi-stakeholder group founded in 2015, and investigate what these materials seek to standardize on patient engagement in drug development and what visions of patient engagement are being constructed by them. We take a material-semiotic approach, whereby the materials analysed are seen as influential actors, which can work upon and transform issues of concern. The findings indicate that these materials seek to standardise a new beginning for the drug development trajectory, which they (re)locate to the patients' needs and preferences, and long-term relationships between researchers and patients developed through specific methods. A new type of patient is thus envisioned, while researchers and patient organisations are ascribed more complex roles.

Keywords: Patient Engagement, Standardisation, Drug Development

Introduction

Since the 1990s, patient and public involvement (PPI) initiatives in healthcare have proliferated (Doekhie et al, 2018; Caron-Flinterman et al, 2007; Tritter and McCallum, 2006). These initiatives have been fuelled, on the one hand, by democratic arguments advocating for citizens' right to engage in matters directly concerning them and, on the other, by technocratic rationales, which conceive of (some sections of) the public as a valuable source of knowledge and insights (Martin, 2008; Epstein, 2007, 1996). Behind both these two rationales are manifold challenges and critiques, articulated in many areas of healthcare since the late 1960s. Specifically with regards to pharma-

ceutical and medical research, many scholars have condemned the focus on the 'standard' bodies of white, middle-class men, and research approaches whereby the bodies of women have been rendered into "inconvenient research vessels"(Criado Perez, 2019: 202). Such scholars have thus challenged the deep-seated ideal of "one-size-fits-all medicine" (Epstein, 2007). Another line of scholarship has focused on power inequalities that permeate drug development and revealed, for instance, how pharmaceutical companies would often enrol impoverished, so-called 'ready-to-consent' populations in clinical trials for drugs intended mainly for affluent Western consumers (Fisher, 2015; Petryna, 2009). Furthermore, a prolific and impactful scholarly discussion has concerned the fairer and less exploitative distribution of costs and benefits of medical research and drug development among all those involved (Simpson et al, 2015; Sunder Rajan, 2017).

Yet, for a long time drug development has remained a field where (some kinds of) patients could only become engaged as clinical trial participants (Zvonareva et al, 2022; Perfetto et al., 2015). This state of affairs started to change significantly around 2010, when regulators and governmental bodies, such as the Food & Drug Administration (FDA) in the U.S. and the European Medicines Agency (EMA) in the European Union, initiated a series of measures meant to substantially increase patient engagement in this area (Getz, 2019). For instance, in 2012, the FDA formally introduced the concept of 'patient-focused drug development' (PFDD) and started organising public consultations with patients from 30 disease areas to allow the agency to make more informed decisions in their evaluation of the risks and benefits of new therapeutic approaches (Chalasani et al., 2018; FDA a, n.d). Importantly these developments have been taking place in the context of the growing use of social media and other digital platforms among patients and patient organizations interested to acquire or share insights about their treatment needs and experiences (Egher, 2019).

As regulatory agencies and pharmaceutical companies have noted considerable variation and lack of clarity in how different stakeholders understand patient engagement in drug development, its implementation, assessment, and the role it should play in the evaluation of marketing applications, growing calls have been made for its standardisation (Hoekman and Boon, 2019; Vat et al, 2020). Pharmaceutical companies have been among the main proponents of standardisation, which they frame as a way to ensure the uniformity, comparability, and quality of patient engagement projects. These calls have already been accompanied by substantial undertakings, such as the establishment of new organisations and the development of new tools to standardise patient engagement in this area (Vat et al., 2021; Schuitmaker-Warnaar et al., 2021). The Patient Engagement Management Suite developed by the Patient Focused Medicines Development (PFMD) (PFMD, n.d.) and the Patient Engagement Toolbox that the Patients Active in Research and Dialogues for an Improved Generation of Medicines (PARADIGM) (PARADIGM a, n.d., PARADIGM b, n.d.) put forward are relevant examples.

Yet, rather than being neutral solutions, standards constitute powerful tools through which particular visions are imposed, certain types of knowledge are legitimated, and roles and responsibilities are (re)distributed in ways that enhance the authority of some actors rather than others (Timmermans and Berg, 2003). We aim to make a contribution by considering these aspects and by focusing on the case study of PFMD, a large multi-stakeholder group in the field of patient engagement in drug development (PFMD, n.d.). As PFMD is widely known and influential in this field despite lacking the formal authority to impose standards, in this paper we answer the following questions: What do the PFMD-produced materials aim to standardize in regard to patient engagement in drug development? What visions of patient engagement in drug development are constructed by these materials?

A note on how we use the term 'patient engagement' here is in order. Whereas initially practitioners in the field advocated for the term 'patient involvement' (see Hoos et al, 2015), which they believed better highlighted the active role of patients, in recent years 'patient engagement' has been predominantly used. In this article, we align our terminology to the one encountered among the practitioners and in the artefacts we studied and therefore use 'patient engagement' as an

emic term. There has not been much conceptual work to define patient engagement specifically in drug development, yet one definition put forward to date proposes to understand patient engagement as "the effective and active collaboration of patients, patient advocates, patient representatives and/or carers in the processes and decisions within the medicines lifecycle, along with all other relevant stakeholders when appropriate." (PARADIGM, in Vat et al, 2020:7)

As the standardisation efforts of the PFMD-produced materials are ongoing, we cannot analyse their full trajectory from inception to final acceptance or failure. Instead, we draw on the existing literature on standardisation to understand how these materials, consisting of documents and data collected from online public events, attempt to mould a diverse set of practices in patient engagement in drug development. Overlooking the question of these materials' actual impact upon practices, we focus instead on how a particular take on standardisation is architectured and structured through them. Thus, we take a material-semiotic approach, whereby we understand the materials and events PFMD has developed and organised as important actors, that work upon, shape, and even transform patient engagement. We build upon Asdal's (2015) and Asdal and Hobaek's (2016) perspective on the role of documents, to argue that these materials actively seek to shape the future in a way that bears the imprint of PFMD's own position, while being agents in their own right.

Theoretical approaches to standardisation

Standards are often assumed to be neutral or even democratising tools, and tend to appear as particularly desirable solutions in situations where variation and diversity of practices are seen as problematic. For example, in healthcare, standardisation has historically been at the heart of professionalization efforts, as standards have been used to support the medical professionals' claim to exclusive expertise in this domain (Abbott, 1988; Timmermans and Berg, 2003). By centralising and uniformising the education medical professionals received and the skills and tools they used, these professionals could be better distinguished from amateurs and charlatans, and their overall prestige and authority could be increased. This means, however, that far from being neutral tools, standards designate mechanisms of control and accountability and ascribe roles and responsibilities (Busch, 2011). Similarly, the democratising potential of standards and their ability to contribute to levelling the playing field have also been challenged. Thus, Science and Technology Studies (STS) scholars have highlighted that standards reflect the opportunities and limitations inherent in the contexts in which they emerge (Bowker, 2008; Lampland and Star, 2009), and that standardisation proceeds through important negotiations (Epstein, 2021).

Who takes part in the development of standards and in what ways depends on the types of knowledge that are considered most valuable in relation to the practices under discussion, on the level of authority and prestige one enjoys, and on the specific goals that standards are meant to achieve. For instance, the success of the Pap smear as a standard cancer prevention tool hinged on a gendered division of labour, one that maintained the status of the (male) pathologists. As most cytotechnicians who performed the analysis of the histological slides were low-paid women, the overall costs could remain low, thereby fulfilling one of the requirements for a public health intervention (Casper and Clarke, 1998). Standards can thus come to function as means through which those with sufficient power and authority manage to impose their own views and ideals upon others. As such, standards can be powerful tools through which certain types of knowledge are legitimated at the disadvantage of others and through which additional rights and privileges may accrue in the hands of those who are already influential.

Standards also play important roles in jurisdictional struggles, as they can be used by new stakeholders to penetrate a given field of practice and to establish themselves as influential to the detriment of 'traditional' holders of authority. For instance, in the 19th century, physicians could extend their jurisdiction over child delivery and replace midwives through the influence they exercised over the development of standards and regulations that restricted certain medical

interventions and the use of particular tools, such as the forceps, to their professional group (Mol and van Lieshout, 1989). In this sense, Timmermans and Berg (2003: 19) noted that "[s]tandards … may become the unfair advantage that the powerful outsiders (...) impose on powerless insiders." These aspects are particularly relevant when studying the standardisation of patient engagement, given the considerable differences in power and authority that have marked relations between patients, researchers and pharmaceutical companies.

Equally relevant to our study is the fact that standards not only reflect knowledge and power relations at a given time, but also actively shape them. Building upon insights put forward by Voß (2016: 129) on instruments of governance and their performativity, we could say that standards "programme the doing of a particular ….reality". Thus, standards are not merely tools through which certain processes can be rendered more efficient, comparable and of similar quality, but they have a productive character. They produce new entities and help bring new realities into being. Furthermore, standards act in conjunction with human actors in what Timmermans and Berg (2003) referred to as processes of 'mutual transformation'. This means that standards can change the practices in which they are embedded and the positions that the involved humans and nonhumans occupy, but they can also be changed through the processes of adaptation and alignment that are required for them to be embedded in the practices they are meant to govern (Timmermans and Berg, 2003; Lampland and Star, 2009; Timmermans, 2015). We can think here of various approaches through which physicians and nurses adapt and circumvent standards to achieve their goals, be that the continuation of disability benefits for some patients, or the selection of a mental health diagnosis that would not be overly stigmatising, while maintaining access to treatment (Bowker and Star, 2000).

It is important to mention that standards have a voluntary character: they emerge as a result of various alliances, and acquire, retain, or lose traction depending on the strength of these alliances. For standards to function, they need to be persuasive and present important advantages to the actors meant to follow them. Such advantages may range from instrumental benefits, such as heightened efficiency and productivity, to social gains, such as a greater reputation and public standing. These aspects are relevant to understanding how the PFMD-produced materials envision future practices, so that they motivate important actors to support patient engagement in drug development.

Standardising patient engagement in drug development: An overview of the field

Efforts to standardise patient engagement in drug development are not necessarily surprising, given that standardization has now penetrated most medical settings and considering the growing interest to assess the impact of patient engagement in drug development (Vat et al, 2021). As already indicated, in both the U.S. and Europe, growing efforts have been made in this sense over the last decade (Hoekman and Boon, 2019). In this section, we briefly delineate the most important initiatives in the field to locate our case - the standardisation efforts of PFMD-produced materials - among them.

Important early initiatives to standardise patient engagement in drug development were launched by regulatory bodies. After the PFDD initiative was inaugurated in 2012, on December 13, 2016, the 21st Century Cures Act was signed into law in the U.S. The Act is meant to "help accelerate medical product development and bring new innovations and advances to patients who need them faster and more efficiently" (FDA b, n.d.). One of its provisions requires the FDA to introduce methodological guidances to support PFDD, and this is highly important, given that guidelines are the main tools through which practitioners and policy makers seek to reduce variability and to increase efficiency in healthcare (Borgstrom and Dekker, 2022). By July 2022, the FDA had issued two guidances: "Patient-Focused Drug Development: Collecting Comprehensive and Representative Input" (June 2020) and "Patient-Focused Drug Development: Methods to Identify What Is Important to Patients" (February 2022) (FDA a, n.d.). As their titles suggest, these

guidances contain authoritative statements about the types of patient insights that can be relevant for drug development, and they prescribe the course of action pharmaceutical companies and drug researchers should undertake to collect such insights. Both documents bear the subtitle "Guidance for Industry, Food and Drug Administration Staff, and Other Stakeholders". This indicates the expectation that these recommendations are accepted and taken up by the main actors in this field, which is central to the adoption of new standards. Considering how roles and responsibilities are distributed in the development and marketing approval of new medicines, this subtitle also implies that these documents contain actionable information meant to guide the regulatory assessment of patient insights. Supporting this point is the fact that two additional guidances are under construction at the time of writing: one focusing on selecting, developing, or modifying fit-for-purpose clinical outcome assessments and one on incorporating clinical outcome assessments into endpoints for regulatory decision-making (FDA a, n.d.). Even though the EMA has not yet engaged in explicit standardisation efforts, in 2016, it set up a 'cluster' on patient engagement together with the FDA. The cluster aims "to share experiences and best practices on the way the two agencies involve patients in development, evaluation and post-authorization activities related to medicines." (EMA, n.d.) The guidances discussed above are likely to feature prominently in these exchanges, and as such, they might also inform the standardisation of the use of patient insights in drug development in Europe.

Industry players also joined these standardisation efforts early on. In the same year that the FDA launched the PFDD Initiative (2012), TransCelerate Biopharma Inc. was founded, a non-profit organisation aiming to promote collaboration among all pharmaceutical companies. TransCelerate has focused its standardisation activities on a more granular level than the FDA, creating tools meant to guide and, thus, render general and uniform engagement practices at specific stages of the pre-market life of medicines (TransCelerate a, n.d.). Thus far, TransCelerate has developed a Patient Protocol Engagement Toolkit (P-PET) "to guide the engagement of patients early in protocol development" (TransCelerate Biopharma Toolkits Core Team et al., 2020: 1489) and the Study Participant Feedback Questionnaire (SPFQ) to assess the experiences of patients participating in clinical studies (TransCelerate b, n.d.). TransCelerate seems to aspire to standardise these practices at an international level, as the templates of the SPFQ have been made available in over 15 languages. Furthermore, other materials developed for this initiative can be accessed in at least one other language, such as Japanese, Mandarin, or Chinese.

New multi-stakeholder initiatives to standardise patient engagement in drug development have also emerged. One of the most established is the European Patients' Academy on Therapeutic Innovation (EUPATI), a public-private group founded in 2012. It was jointly funded by the European Commission and the European Federation of Pharmaceutical Industries and Associations. EUPATI has made substantial efforts to centralise and uniformise the education it frames as necessary for patients to fruitfully participate in the research and development of new medicines (EUPATI, n.d.). Thus, EUPATI's Patient Expert Training Programme includes an extensive list of domains and competencies expected of patients who have undergone the training. The graduates of the program are granted the title of patient experts, which serves as proof of their 'professionalism' and helps distinguish them from patients whose insights about drug development may not be as broad, thorough, and systematic. The activities of PARADIGM are also worth noting here, as this organisation has been funded by the Innovative Medicines Initiative (IMI) between 2018-2020 to develop a toolbox meant to help standardise patient engagement in drug development. Thus, the tools, methods, and metrics developed by PARADIGM are intended to reduce "inconsistency and fragmentation" and "to support mainstreaming the integration of patient perspectives and experiences" (PARADIGM b, n.d.) by aligning them with the frameworks and approaches developed by EUPATI and PFMD. Furthermore, the PARADIGM Patient Engagement Monitoring and Evaluation Framework provides standardised information to guide how the costs and benefits of patient engagement activities in drug development are calculated for all stakeholders involved.

As this overview indicates, regulators, the industry, and other relevant stakeholders have made important efforts to standardise (various aspects of) patient engagement in drug development. Established in 2015, PFMD, the initiative whose materials we explore here, is relatively a newcomer in this arena. However, it provides a suitable vantage point for understanding the formation and dissemination of standards and visions of patient engagement in drug development. PFMD's suitability is due to its being a stable and long-term collaboration rather than a time-bound project such as PARADIGM. It is also informed by its exclusive focus on patient engagement and its aspiration to provide exhaustive guidance for every stage of drug development. The latter distinguishes it from organisations such as TransCelerate, where patient engagement is only one of the core topics in their portfolio and where standardisation efforts have focused on a limited and very specific set of instances. Lastly, PFMD's global aspirations are another important aspect of its scholarly appeal, which sets it apart from the nation- or region-bound relevance typically pursued by regulators. In the following section, we provide more information about this organisation and the methodological decisions underpinning our analysis and the findings presented here.

Methodology

PFMD currently includes 40 members, ranging from important patient organisations, such as the European Organisation for Rare Diseases (EURORDIS) and the National Kidney Foundation in the U.S., to international pharmaceutical companies, such as Pfizer, Lilly, and Janssen, and national advisory organisations, such as the National Health Council in the U.S. or the Health Research Authority in the U.K. This diversity is also at the heart of PFMD's mode of governance, as its board comprises representatives of patient organisations and of the pharmaceutical industry, with efforts underway to include members of regulatory bodies and of Health Technology Assessment (HTA) agencies in the future. Its funding stems mostly from membership fees and the industry training it provides. Even though PFMD's main partners to date are based in Europe and North America, the group has global aspirations, which it is actively pursuing, as a few recent inroads in Asia suggest. On its website, PFMD positions itself as "The patient engagement platform" (PFMD, n.d.), and openly alludes to its standardisation ambitions. Thus, it states that its mission is "to bring together initiatives and best practices that integrate the voice of the patient thereby speeding up **the creation and implementation of an effective, globally standardised framework** – that involves patients as partners – as well as the necessary tools, services and support to allow the adoption of the framework by various stakeholders" (PFMD, n.d., emphasis ours).

Sampling and Data Collection

To understand how the PFMD-produced materials seeks to standardise patient engagement in drug development, we relied on the following data: three How-To Guides (HTGs) that PFMD developed in the period 2019-2022 and which were available when this study was initiated[2]; the Patient Engagement Training (PET), which is the only training PFMD has thus far developed and which is mainly intended for the pharmaceutical industry (followed online by one of the authors); and the content of three Patient Engagement Open Forum (PEOF) sessions (2020-2021) observed by one of the authors. These materials were selected as they are part of PFMD's core output and are deemed central actors. This is because they are intended for varied audiences and are the products of different types of collaborations: between different stakeholders with a specific mandate and common goal in the case of the HTGs; between pharmaceutical companies as commissioners and clients and PFMD as the developer and provider of PET; and between different organisations seeking to further public dialogue and cohesion about patient engagement in drug development through PEOF. We considered this aspect important, because the materials developed through such collaborations can be understood as statements of common understanding in a very complex and charged field. Furthermore, such close involvement of important stakeholders increases the chances that the standards these materials prescribe will be widely adopted. The analysis

of these different types of materials allowed us to understand whether the framing of patient engagement they put forward was aligned and circulated throughout and across all of PFMD's collaborations or whether important differences could thereby be identified in relation to different stakeholders.

The HTGs are documents developed and made publicly available by PFMD and are presumably widely circulated among its network. The initiative to develop these materials belonged to this group itself, which used the initial PEOF sessions to identify the main topics on which the HTGs should focus . Subsequently, working groups consisting of different types of volunteering stakeholders were created for each HTG, with the task of developing an initial HTG draft. This document subsequently underwent several alterations, as a result of internal consultations, of public feedback received on a draft version made available online for a period of several months, and of reactions acquired during PEOF sessions. Therefore, each official HGT emerges as a result of multi-stakeholder collaboration. PFMD PET has been developed specifically for members of the pharmaceutical industry. It consists of two levels and involves presentations, brief interviews, examples of patient engagement activities, and two survey-based tests. If they score sufficiently (70% or higher), training participants can receive a Patient Engagement Certification upon completion. PFMD claims that over 30,000 researchers have completed the PET so far. The PEOF was initiated in 2019 and currently consists of a series of multi-stakeholder public meetings that PFMD organizes four times per year, together with EUPATI and the European Patients' Forum. Even though the PEOF sessions have a public character, we decided to anonymise the participants discussed in this article by replacing their names with pseudonyms and mentioning only the stakeholder group they belong to.

Data analysis

The data were analysed using thematic analysis. Inspired by the work of Latour (1987) and Asdal (2015), we took a material-semiotic approach, attending to these materials not merely as particular descriptions of a given reality but as actors that actively shape this reality, "working upon, modifying, and transforming" it (Asdal, 2015: 74). This approach allowed us to analyse the materials we collected as agents working to set particular changes into motion in the field of patient engagement in drug development. The early stage when we studied these materials did not allow us to engage in document ethnography (Asdal and Reinertsen, 2021) and observe the constellations that they come to be part of and the effects they have. Nevertheless, this approach enabled us to look at what these materials *do*, to study them as aspirational *tools of governing* (Asdal and Reinertsen, 2021: 42), which seek to (re) shape roles and responsibilities regarding patient engagement in drug development. Asdal and Reinertsen (2021) emphasise that a document (or a material as we term the PFMD outputs) entails action and its analysis can discern what it does. This is an important difference compared to other useful analytical approaches, such as discourse analysis. This material-semiotic approach allowed us to focus on what the collected materials do and enable through the rhetorical strategies they contain, the concepts they mobilise, and the alliances they establish with other documents and actors (Asdal and Reinertsen, 2021). It also allowed us to be mindful of the types of engagement these different materials allow for and of those they constrain. Most importantly, this material-semiotic approach served as a powerful reminder that our analysis is positioned within the specific context of these materials' emergence and that the trajectory we trace here is only the beginning.

Findings

Analytic codes and categories were constructed iteratively through multiple engagements with the data collected and with the relevant literature. The main themes that we identified focused on the object(s) of standardization at the heart of these materials, on the transformations that the stakeholders that were framed as relevant were expected to undergo, and on the properties of the materials. This allowed us to better understand how the content, form, and positionality of these materials framed the object(s) of standardization and the transformations identified. For

an overview of the main coding scheme, please see Appendix 1.

The analysis indicates that despite the uncertainty and diversity currently characterising patient engagement activities, the PFMD materials we studied target a specific aspect in their efforts to standardize patient engagement in drug development. They also convey a clear vision of the ways in which patient engagement should be implemented in drug development. These materials thus position themselves as authoritative maps, orienting their users regarding the actions to take and their appropriate sequence, to ensure that patients are engaged substantially in drug development. As may be expected given the specific genre to which they belong, the HTGs and the training are action-oriented and function as tools for the realisation of a specific vision of patient engagement in drug development. They frame certain approaches as necessary and desirable while closing off others. We argue that in so doing, these materials seek to shape the currently vague contours of patient engagement and to configure coordinates for its future development. In what follows, we show that the PFMD-produced materials seek to standardise patient engagement in drug development by relocating the beginning of the drug development trajectory and advising that patients and researchers develop long-term relationships through the use of specific tools and methods. These materials put forward a new type of patient, who will fulfil the roles of representative and research consultant, while drug developers are to act as hospitable hosts to patients, and patient organisations are to function as mediators and education providers in ways that we discuss in more detail below.

A different starting point for drug development

The PFMD-produced materials seek to ensure that the engagement of patients in drug development becomes standard practice by relocating the starting point of the drug development trajectory from the evaluations and considerations of researchers, where it has been traditionally situated, to the patients' needs and preferences. They do so by switching the focus from the degree to which currently available treatments effectively act upon biological processes or meet the expectations of medical professionals, to the experiences and levels of satisfaction of patients. Thus, before setting out to study or develop any new molecule, drug developers are advised to consult with patients, as most of the PFMD-produced materials showcase the following question as the main consideration for drug developers to bear in mind: "Are we addressing an unmet need with this research?" (HTG_CTP, 2021: 21) Similarly, patient engagement is described as contributing to "the identification or prioritisation of unmet patient needs" (HTG_EP, 2021: 5), "potential gaps in clinical care" (HTG_EP, 2021: 21), and "outcomes [that] are important to patients"(HTG_EP, 2021: 24).

This approach was also mobilised at the PEOF sessions observed, where a researcher sought, for instance, to transform the understanding of health by arguing that it could no longer be defined from the (clinical) disease perspective but that it had to be informed by the patients' perspective (P8, PEOF, June 24, 2021). Similarly, the PFMD patient engagement trainees are informed that patient engagement is highly necessary because**:**

> We are beginning to recognize that whereas in the past surrogates spoke on behalf of patients, and they were well intended, their understanding about the outcomes that are most important to patients was often wrong. It's critical that we focus on how people feel, function and survive. But if you're going to understand how people weigh those three issues, you have to engage them. And you'll be seeing a complete paradigm shift in how we conduct research, develop new medicines, and bring those medicines into delivery systems, and provide them to people in a meaningful way that addresses their clinical outcomes, but also the social and behavioural determinants of health and the issues that just simply are important to them and their families. The concept of patient engagement is not new; we've engaged patients and their families at the point of care for many, many years. What is new is engaging patients and sub-populations of patients to understand what outcomes are important to them and how they weigh those outcomes. (T1, PET, Level 1)

As this quote indicates, to relocate the starting point of the drug development trajectory to patients' needs and preferences, the training

materials expand the meaning of effectiveness beyond biomedical evaluations to include social and personal considerations. Thus, the process of drug development itself becomes an issue belonging to patients, whereby their participation is legitimated and made into an obvious solution rather than a problematic or controversial move. This indicates that one aspect of the standardisation of patient engagement in drug development that the PFMD-produced materials seek to operate is the uniform relocation of the beginning of the drug development trajectory to patients' needs and preferences.

To ensure that the alignment between patients' needs and technical considerations is retained throughout the remainder of the drug development process, these materials further attempt to standardise the development and maintenance of long-term relationships between researchers and patients. This is a future-oriented endeavour; although such relationships are currently largely absent, and the regulatory and organisational environment required to support them does not yet exist, these materials frame them as necessary for the acquisition of patients' insights. To enact these relationships, the PFMD materials reconceive patients from mere participants in clinical trials into "[p]atients [who] are part of the research team"(HTG_EP, 2021: 26) or "patient partners" (HTG_CTP, 2021: 9; HTG_EP, 2021: 5). These materials also transform the type of interactions between patients and researchers, which in this area have hitherto been largely absent or indirect at best, into "sponsor-patient partnership in research"(HTG_CTP, 2021: 9), and rapports of "co-creation", "co-development", and "co-design".

These interactions are accompanied by the creation of new obligations and responsibilities, such as the need to ensure that "long term partnerships with patients are created and nurtured" (HTG_EP, 2021: 8) and that "[t]his Patient-Researcher collaboration should be dynamic and continuous, not a one-off event"(HTG_EP, 2021: 19). In many countries, such exchanges have been and remain illegal due to power differences between patients and pharmaceutical companies, which have prompted many to consider such encounters too risky and problematic. The novelty of these exchanges is enacted in the PFMD-produced materials through the provision of detailed advice regarding how relations between these stakeholder groups should be set up, developed, and maintained. Nevertheless, such exchanges are also framed as a sine qua non condition for ensuring not only that the patients' needs and preferences become the starting point of the drug development trajectory but that they also substantially shape the remainder of this process. To be firmly embedded in drug development, these exchanges require modifications in regulation, legislation, financing, and reimbursement. Thus, in seeking to standardise long-term relationships between researchers and patients, these materials orient future actions across numerous domains where novel approaches are required to ensure their successful implementation.

The PFMD-produced materials also configure the development and maintenance of such relationships as requiring standardised methods and tools. Thus, they mobilise the Patient Engagement Quality Guidance (PEQG), which is itself the result of PFMD-initiated co-production activities, as the right instrument for this goal: "The PEQG should be used as a reference in setting up partnerships, planning, and preparing for involving patients as partners in your research. The seven Quality Criteria can help consider others' expectations and manage them." (HTG_EP, 2021: 8). Another HTG frames it in a similar fashion: "[t]he Patient Engagement Quality Guidance (PEQG) is proposed as a reference in planning and preparing for involving patients in the process of designing a clinical trial protocol"(HTG_CTP, 2021: 3). Furthermore, to shape patient engagement in drug development, the materials we analysed need to be taken up in future practice and for this, they need to demonstrate their merits. Such demonstrations are performed rhetorically by highlighting their ease of use and highly practical character, as the following quote illustrates:

> Our objective was to develop a practical how-to guide that describes the process of publication related PLS [Plain Language Summaries] creation and dissemination through a straightforward 7-step approach that ensures early patient engagement. While navigating this stepwise process, the user will be guided towards tailored

> tools and examples, as well as a methodology to assess the importance of involving patients at each key milestone. The guidance can be used from planning through to the delivery of a PLS to encourage co-creation with the intended target audience. (HTG_PLS, 2021: 6)

To increase the likelihood that the standards they put forward are taken up in practice, the PFMD-produced materials mobilize visions of patient engagement in drug development whereby the roles and responsibilities of those whom they frame as the main issue holders are re-configured. These re-configurations do not seem to diminish the standing and authority of any one stakeholder but rather to provide each of them with important benefits. In the next sub-sections, we show that these materials operate a series of transformations in regard to how patients, researchers, and patient organisations are understood, so that the relations between them appear balanced and fruitful.

Patients as knowledgeable drug development partners

In their attempts to standardise patient engagement in drug development in ways that are appealing to the main stakeholders, the PFMD-produced materials put forward a new type of patient, who is ascribed new roles and responsibilities based on the many skills they are envisioned to possess. At the most basic level, these patients are called upon to act as representatives, as they are expected to be capable not only of describing their own experiences with illness and treatment in ways that are understandable to researchers but to also relay collective states, needs, and preferences. In this role, they are ascribed responsibility for developing and maintaining long-term relations with researchers. To achieve this, they are advised to display reflexivity and communication skills, to be understanding, and to show that they are able to accept that the development of new drugs takes time and does not always lead to the desired results. Not all patients are envisioned as being equally able to function as representatives, however, and their level of familiarity with the drug development process is used in the PFMD-produced materials to operate important distinctions between them. This is illustrated by the enumeration under "the type of patient partner profile needed (i.e., 'naïve' patient, patient advocate, patient expert, carer or family member, patient community)" (HTG_CTP, 2021: 8) and by the following quote:

> Involving patient partners with varying degrees of exposure to/involvement in clinical trial protocol development is important for gaining a diversity of perspectives that will help improve the clinical trial design. Also, involving patient partners who have never taken part in a clinical trial before can be insightful. (HTG_CTP, 2021: 20)

To fulfil such responsibilities, patients are required to reflect upon their experiences and those of others and to choose the ones they find most urgent. Thus, these materials pave the way toward a future hierarchy of patients' needs and preferences.

This new type of patient is further ascribed the role of research consultants, entrusted with the responsibility of guiding research. For instance, patients are expected "to direct the preclinical research focus" (HTG_EP, 2021: 23) and to assist researchers in their prioritisation endeavours: "[t]he goal of patient engagement is to work together to determine what is a 'must-have' compared to 'nice to have' within the scientific capabilities of the research" (HTG_EP, 2021: 14). Similarly, one of the advantages of early engagement with patients highlighted at a PEOF session was the fact that "you don't do studies that don't make any sense" (P11, PEOF, June 23, 2021).

In their role as consultants, patients are further ascribed the responsibility to contribute to the development of methodological tools, as the following quote indicates:

> Co-creating questions provides the research team with direct patient insights on the condition experience. Because patients know best how they prefer to be asked about their condition, they should be consulted regarding such questions. Involving patient organisations and patients (usually in a steering group) in shaping these questions, can make them feel that their opinions matter and are respected, promoting effective engagement. (HTG_EP, 2021: 19)

Another responsibility that patients are expected to fulfil in their role as research consultants in drug development is the evaluation of the appropri-

ateness of tools and approaches for specific projects. Thus, researchers are advised on "working with patients to evaluate and identify the optimal approaches to address research objectives (both in the laboratory and clinical research)" (HTG_EP, 2021: 9) as well as to "generate patient-focused insights which can ultimately facilitate the development of outcome measures for future clinical studies" (HTG_EP, 2021: 23). Patient contributions are thus envisioned as helping to bridge the gap between the measures and outcomes currently used in drug development and what actually matters to patients, which are framed by these materials as being rather different.

As could already be noted in some of the quotes provided above, these materials ascribe patients the roles of representatives and especially consultants largely indirectly, by calling upon researchers to give them the opportunity to fulfil the responsibilities these roles entail. This tactic may be meant to placate drug developers concerned about the consequences that the standardisation efforts of these materials may have on their authority and standing. Thus, the partnership these materials configure is one in which the researchers' authority is not diminished by acknowledging patients as epistemic agents.

To summarise, the PFMD-produced materials articulate a new type of patient, expected to be able to function as representatives and/or research consultants in drug development, depending on the skills, types and level of knowledge with which they are endowed. Although patients are ascribed a much more prominent role by this configuration, care is taken not to obfuscate the researchers, whose collaboration is needed for the standards encoded in these materials to be implemented in daily practices. However, this does not mean that the researchers involved in drug development are not expected to significantly change their ways. On the contrary, they are called upon to diversify their skills and methods, as we shall see below.

Researchers as knowledge-developers through proficiency in diversity

The PFMD-developed materials sketch a different role for the researchers involved in drug development, who are urged to act as hospitable hosts to patients for the sake of developing better medications. Thus, these materials encourage researchers to become better and more empathetic communicators and to take an open and inclusive stance toward patients. For instance, they emphasise how important it is that "the patient voice is heard and understood in all research projects involving Patients" (HTG_EP, 2021: 23) and argue that "minimizing the burden on the patient community is crucial, as well as ensuring that their input is respected and acted upon" (HTG_CTP, 2021: 16). Whereas the technical knowledge with which researchers are endowed is depicted as obvious and readily available, the PFMD-produced materials frame the degree to which they appreciate patient engagement as variable. As such, those interested in pursuing patient engagement are advised to "[i]dentify if sponsor research teams need to be trained on the value of the patient engagement and how to engage patients" (HTG_CTP, 2021: 16). Being willing to engage with patients in the development of new drugs is thus framed as a new capability that researchers need to develop to ensure the success of such interactions. Furthermore, researchers are expected to become proficient in "the new science of patient output", as the acquisition of patient insights is framed as requiring a new systematic approach:

> I don't see any expert who is adequately trained to adequately engage with patient organisations, with patient experts… There are not the right expectations even before we start the engagement. No stakeholder is fully ready and equipped now to engage with patients. (P1, PEOF, July 2020)

To function as hospitable hosts for patients in drug development, researchers are called upon to broaden the variety of methods and tools they use. They are urged to acquaint themselves with research and data collection approaches specific to the social sciences, to learn how to conduct interviews and organize focus groups. Furthermore, they are expected to develop the necessary skills to engage via social media, through play, or storytelling with different categories of patients. Researchers are advised to make their instruments more accessible or understandable to patients and to use new and more appealing tools for patient engagement. For instance, paediatric

researchers are encouraged to consider the use of cuddly white or red cells, Lego-based depictions of certain disease aspects, or vividly coloured instruments to acquire richer insights into the illness experiences of their young patients and their unresolved treatment needs.

As the PFMD-produced materials transform the methods and tools that researchers are expected to work with, the types of relevant and actionable data are also diversified. Thus, researchers are envisioned as being able to make sense of structured and unstructured quantitative and qualitative data in their work, as the latter are substantially shaped by patient engagement. Illustrative in this sense is a remark by a PEOF participant working on a new integrative approach, who stated that "standardised, meaningful, interpretable data, leading to action outcome sets, that integrate the perspective of different actors, need to be developed as a first priority" (P8, PEOF, June 22, 2021). Such data, however, may not only have a more subjective character but may also be unstable, dynamic, hard to measure and compare. From this point of view, acting as welcoming hosts to patients seems to require a substantial expansion of what is currently understood as scientific evidence in drug development. Although the PFMD-produced materials remain silent about this aspect, it would constitute a reorientation both at the level of practice and ideology that not all researchers and the other stakeholders involved may be prepared for and that may require different legal provisions.

By stating the importance of clear knowledge of the patients' needs and preferences, the materials analysed also ascribe researchers their share of responsibility in developing and maintaining long-term relationships with patients:

> The patient community needs to know how their input made a difference and how they influenced the decision-making, reporting, and dissemination process. Patient partners should also know when their input could not be considered and the reasons should be explained to them. Sponsors should be prepared to proactively provide feedback to patient partners. (HTG_CTP, 2021: 12)

Even though these long-term relationships are one of the main aspects that the PFMD-produced materials seek to standardise, the uniformity they seek to achieve does not seem to extend to the format of the encounters between researchers and patients. Although various formats are suggested —ranging from Patient Research Exchange Meetings, which seem to take the shape of roundtable talks, to the organisation of focus groups, or direct consultations— no specific one is prescribed. Instead, this aspect is left at the discretion of the organisers of patient engagement activities, which testifies to the researchers' role as hosts, given that most of the time these organisers are understood to be pharmaceutical companies.

To achieve this new envisioned role, the PFMD-produced materials seek to enrol the pharmaceutical companies to which the researchers belong as allies, as resources need to be made available and organisational changes are required. These materials therefore enthuse about the benefits of patient engagement: "[e]ngaging patients "as early as possible" is recommended to improve research outcomes, de-risk early science, and avoid systematic errors, reputational losses, and further disinvestments…" (HTG_EP, 2021: 5). Thus, they re-frame the role of pharmaceutical companies by addressing them not only as commercial but also as societal actors, interested in furthering the common good: "[t]his [patient engagement] permits drug development to focus on what is important to Patients and caregivers, ultimately improving their daily quality of life and their long-term contribution to society" (HTG_EP, 2021: 5).

Overall, the PFMD-produced materials seek to guide the actions, skills, and attitude of researchers toward a future where they act in accordance with these materials' specifications by being hospitable hosts to patients in drug development. The future that is thus being configured does not, however, bring new roles and responsibilities only to patients and researchers but also to patient organisations. As we shall see in the next section, the latter are ascribed a central position as mediators.

Patient organisations and their mediating role

The PFMD-produced materials envision the highly relevant relations between researchers and patients that they prescribe as requiring

the mediation of patient organisations. This is because individual patients and researchers are understood to be missing the type of knowledge that would allow them to successfully interact with each other directly. Patient organisations are ascribed the responsibility of addressing this knowledge gap and are made into the first points of access to patients for the researchers: "[p]atient organisations - where they exist - are the first and key point of contact to identify individuals and/or experts to engage to ensure the right match for the right activity" (HTG_CTP, 2021: 8). This position is reiterated by another guidance, that advises researchers to consider the following question: "Are there any patient organisations that could help you to reach a diversity of patients, or at least collect their voice?" (HTG_PLS, 2021: 27)

In their role as mediators, patient organisations are expected to be well informed about the broad range of illness experiences of their members: "Reach out to patient organisations to understand the comorbid conditions that might affect the target populations." (HTG_EP, 2021: 29) Furthermore, they are also ascribed the responsibility of selecting patient representatives. Thus, patient organisations are expected to be able to recommend 'the right type' of patients for specific patient engagement projects and to be able to correctly understand and apply norms and considerations regarding accessibility and diversity. For instance, those interested in developing patient engagement activities are warned that "[n]o one can speak for all patients with a particular disease. Patient organisations need to make reasonable efforts to reflect a diversity of opinions" (HTG_CTP, 2021: 16).

Patient organisations are also ascribed the role of trainers or education providers for patients, as the PFMD-produced materials bestow upon them the responsibility to prepare their members for patient engagement activities and to ensure that they have or can acquire the necessary competencies to fruitfully contribute to drug development. Thus, patient organisations are expected to train patients to reflect on their various illness experiences and to identify and appropriately articulate those with a collective character. The importance of these activities can be inferred from the fact that these materials urge the organisers of patient engagement initiatives to make sure that patient organisations have the necessary resources in this scope and suggest that they should otherwise be supported in their acquisition of needed resources. Beyond these considerations, however, these PFMD-produced materials do not engage with local differences and other types of inequality, which might make it difficult for some patient organisations to fulfil these responsibilities.

By ascribing patient organisations the role of mediators, the PFMD-produced materials seek to re-position them as authoritative stakeholders on par with the researchers. This is made obvious by the way in which these materials are structured. For instance, in one of the HTGs, the tasks to be undertaken in preparation for and during patient engagement activities are organized by focusing only on what researchers and patient organisations should do (HTG_EP, 2021). Furthermore, researchers are advised to engage in co-production with them, as the following excerpt illustrates: "Try to get the patient organisation to co-lead the outreach, co-organize the activity and co-facilitate" (HTG_EP, 2021: 47).

Whereas the PFMD-produced materials make patient organisations central actors in drug development, they also operate an important exclusion, as the type of patient they consider for engagement in drug development is the member of a patient organisation rather than any individual patient. Although, in principle, patient organisations may seek out unaffiliated patients out of their own initiative, these materials do not make any suggestions or recommendations in this regard. They, however, instate a distinction between the types of knowledge patients are endowed with depending on their membership in patient organisations and place different value on them. From this point of view, the new type of patient that these materials articulate appears to be one whose knowledge and skills can mainly be guaranteed or vouched for through such a membership. For instance, whereas the HTGs and the PET make the knowledge of patients active in patient organisations relevant and show appreciation for it, the knowledge of unaffiliated patients is largely excluded. Thus, even though there are several references to "patient groups and patients",

it is not obvious how the latter could participate in the drug development process, especially in the early stages, given that patient organisations are configured as first points of contact. That this distinction is performative and has already been taken up in practice became obvious at a PEOF session, in which some patients needed help to indicate the stakeholder category to which they belonged, as they were in doubt between 'patients' and 'patient organisation members'.

Discussion

The standardisation efforts this article has focused on can be understood as part of a broader tendency to "regulate and calibrate social life" through standards (Timmermans and Epstein, 2010: 70). Yet, even though the health domain in which these endeavours are undertaken has historically been characterised by the availability and strict enforcement of standards and regulations, the case we analysed is particularly interesting because it addresses a field up till now devoid of standards. It is important to reiterate, however, that PFMD is not the only initiative that focuses on standardising patient engagement in drug development. However, PFMD, perhaps, has the farthest-reaching ambition to achieve uniformity in patient engagement at every stage of drug development globally. As a non-regulatory initiative, it cannot exert direct influence, but it seeks to indirectly steer and mould practices by propagating its guidelines with the support of the pharmaceutical companies, patient organisations, and regulators with which it works.

PFMD's efforts are particularly relevant because the standards the materials they produce put forward are meant to ensure patient engagement in a field from which patients have thus far been largely excluded. Despite its complexity, these materials frame patient engagement as a feasible and manageable process, consisting of sets of action performed in a given order and at specific stages of the drug development process. Although standards are typically future-oriented, the PFMD-produced materials we analysed act across multiple temporal dimensions to achieve specific rhetorical effects. The depth and breadth of the transformations these materials envision certainly point toward and seek to shape the future. Yet, the use of the present tense situates the practices and approaches recommended in the here and now. This helps to minimize the gulf separating these envisioned practices from current reality. It also brings the future closer, thereby assuring the relevant stakeholders of the likelihood of achieving the vision these materials put forward.

Based on our analysis, we have argued that these standardisation efforts rely on the substantial knowledge ascribed to patients, but require patients, researchers, and patient organisations to fulfil different roles. This highlights the political character of the PFMD-produced materials, as with these new roles they try to change the status quo and to redress power relations among the main stakeholders in drug development. What is novel and indicative of this group's commitment to collaborative approaches is the perspective on power and authority implied in these materials, as they do not approach these as a zero-sum game, but as a set of relations where all the stakeholders stand to profit, albeit in different ways. Thus, by positioning the different types of knowledge that patients, researchers, and patient organisations are ascribed as complementary, the materials we analysed seem to envision a new inclusive epistemic environment. From this point of view, the standardisation efforts in the PFMD-produced materials seem to contradict Callon's (2007) view that standardisation in techno-economic networks contributes to new forms of exclusion and to closing off relevant spaces to certain groups.

The openness and inclusivity of this knowledge space are challenged, however, by some of the other moves these materials make. Thus, the mechanism they lay out to engage patients in drug development resembles, to a large extent, the political party systems in democratic societies. Patients interested in contributing to drug development need to become members of patient organisations, whereupon their eligibility for specific patient engagement activities is determined by the latter. Yet, whereas in politics the party members placed on voting lists still need to be elected by the constituency they are meant to represent, in this case, it remains unclear how

the selection of patients is to be made, based on which criteria, and what checks and balances are or should be made available.

Despite this similarity to the mechanism through which political representatives are elected, the materials we analysed engage to a limited extent with the political dimension of patient engagement in drug development. This might largely stem from the fact that the PFMD-produced materials mainly conceive of patients as knowledge contributors and pay less attention to democratic arguments to justify their inclusion in drug development. As such, they touch tangentially upon the political aspects of this process through the responsibilities they place upon patient organisations to make available a heterogeneous group of patients for patient engagement activities. Yet, as we have seen above, no precise means are indicated to ensure this and the main focus on epistemic arguments may lead to an unequal distribution of the engagement opportunities. Such inequality may be further exacerbated by the discrepancies currently characterising the settings in which patient engagement in drug development is to be conducted and by the particularities of local contexts. Future studies on how patients are selected for engagement in drug development and on the various types of alignment required for implementation in different settings of the standards that the PFMD-produced materials seek to put forward will, therefore, be needed.

Whereas most of the literature on standards and standardisation has focused on the implications standardisation can have either upon newcomers or upon actors who are already influential in a given field, our analysis raises questions about the degree to which mediators might also profit from such processes. By placing considerable responsibilities upon patient organisations and highlighting the relevance of their knowledge, the PFMD-produced materials analysed make these organisations one of the central actors in regard to patient engagement in drug development. Although patient organisations might be overwhelmed by such responsibilities and fail to live up to such expectations, they might also manage to use their central position to exert considerable influence on the drug development process. The performative effects of this positioning and the ways in which these organisations understand to fulfil the responsibilities they are ascribed may help further democratise drug development by ensuring the substantial participation of broader and more diverse categories of patients. However, they may also, advertently or not, contribute to the development of new hierarchies and different types of inequality. The materials we studied therefore seem to be at the beginning of their career as potential standards, as are our epistemic adventures in this field.

Limitations and practical implications

Our study is confined to the initial stage in the trajectory of the PFMD-produced materials, when they have recently been published. Future studies will be needed to follow their trajectory, social life, and to take stock of their impact on this field. The focus on publicly available materials also means that our analysis cannot shed light onto the negotiations, conflicts, and compromises that must have taken place between their contributors. An ethnographic study tracing such materials from the very early stages of their development to their implementation across different settings would complement the insights put forward here. Furthermore, our focus in this paper has been limited to materials developed by PFMD, as we deemed its influential status and innovative approaches worthy of careful analysis. To acquire a better understanding of the broader landscape of patient engagement in drug development, it would be useful to compare these efforts with those undertaken by actors endowed with different levels of power and authority.

The findings of this study point to several practical implications relevant for practitioners and policy-makers. To ensure the uniform, substantial, and fruitful engagement of patients in drug development, materials such as the ones studied here need to be supported by adequate legislation and reforms. Only then will the collaborations between patients and other relevant stakeholders live up to the potential envisioned by the PFMD-produced materials. In particular, the recognition of the substantial role of patients in the development of new drugs should be translated into more daring changes

to guidelines, regulations, and consultancy agreements with commercial actors. Such changes would contribute to a fairer distribution of different types of benefits, including, but not limited to, financial ones. Furthermore, who the patients and patient organizations are that will be included in drug development matters. Practitioners should therefore be careful but also creative as they experiment with different approaches to include a broad diversity of patients and patient organizations in the development of new drugs.

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Notes

1 PFMD has thus far developed a total of four guides.

2 The development of the PFMD guides -based on a step-by step approach, consisting of public consultations, followed by the development of a draft, then the making available of the draft for public comments, its subsequent improvement, and the publication of the final document- closely resembles that used by the FDA for its own guidances.

Appendix 1

Overview of the main coding scheme

Themes	Categories	Codes
Object of standardization	Processes	Different drug development processes
		Different patient engagement processes
	Tools	Questionnaires
		Guidelines/criteria used for evaluation
		Roadmaps/guide books
	Methods	Research methods
		Engagement Methods
Transformations for drug developers	Behaviors	New behaviors/attitudes
		Adjustments to current behaviors/attitudes
		Behaviors/attitudes to renounce
	Tools	New tools
		Adjustments to current tools
	Methods and skills	New research methods and skills
		Adjustments to current research methods and skills
		Renouncing/not using research methods and skills
	Responsibilities	New roles and duties
		Adjustments to current roles and duties
Transformations for patients	Behaviors	New behaviors and attitudes
		Adjustments to current attitudes and behaviors
		Renouncing current attitudes and behaviors
	Responsibilities	New roles and duties
		Adjustments to current roles and duties
	New characteristics	New knowledge and skills
		Adjustments to current types of knowledge and skills
		(No) Membership patient organization
Transformations for patient organizations	Responsibilities	New roles and responsibilities
		Adjustments to current roles and responsibilities
Properties of materials	Content	Topic
		Order of different components making up the topic
		Use of references/hyperlinks
		When/temporal dimension
	Modality	Text
		Image
		Table
	Inter-textuality/ Positionality	References to academic literature
		References to grey literature
		References to similar materials developed by other groups
	Type of engagement	Consumption only/mainly
		Pro-sumption/ Adjustable as needed

Pragmatic Progress and the Improvement of Medical Knowledge for Global Health

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Abstract

The paper presents an epistemological argument on the crisis in medical knowledge today, first identifying a fundamental problem of the crisis, i.e., the *epistemic gap*, and then introducing the concept of *pragmatic progress* as a tool for understanding what is needed for pharmaceutical research to solve pressing epistemic and public health problems. This (new) analysis can contribute to identifying at least one mechanism needed to close the epistemic gap in current medical knowledge, which in turn could serve as a criterion for filtering current and future proposals. In order to do this, first, I show that the drug market has led to a significant *epistemic gap* between the knowledge needed to address pressing public health issues and the knowledge produced following the demands of the global market. Second, using the notion of pragmatic progress, I suggest a reading of the crisis in medical knowledge, which emphasizes the problems that clinical research is set to solve. Then I present two alternative ways to restructure medical research to fulfill this aim, illustrating how each can be implemented through real-world examples. The last section addresses a possible objection to the argument and exemplifies how the criterion can be used to filter undesirable proposals.

Keywords: Medical Knowledge, Pragmatic Progress, Commercialization of Research, Epistemic Gap, Biomedical R&D, Philanthrocapitalism.

Introduction

The globalized privatization of scientific research has been both rampant and vicious for evidence-based medicine and the production of medical knowledge. Pharmaceutical companies now control the performance and funding of the majority of clinical trials and drug development strategies worldwide, and have strong financial incentives to keep unfavorable results confidential, squeeze patent revenues, and prompt doctor prescriptions through massive marketing campaigns. A number of scholars agree that there is something fundamentally wrong in the way Big Pharma conducts scientific research today (Sismondo, 2009; Carpenter, 2010; Dumit, 2012; Goldacre, 2012; Mirowski, 2013; Homedes and Ugalde, 2014; Whitaker and Cosgrove, 2015; Harris, 2017; Moynihan et al., 2019), but less consensus is found regarding the main causes of this crisis, and even less regarding the best way to move forward.

While some blame the culture of secrecy in Big Pharma and demand more transparency (Goldacre, 2012), others attack the patent system

as inappropriate for medical innovation (Light and Maturo, 2015), and still others identify the problem as one of institutional corruption (Whitaker and Cosgrove, 2015). Proposed solutions range from different paths towards Open Science (Nielsen, 2011; OECD, 2015), including open access to trial data and publications (Phelps et al., 2012; Goldacre and Gray, 2016), through strengthening the public and independent funding of medical research (Light et al., 2013; Lexchin, 2016), to a diversity of strategies for democratizing clinical research and making it more inclusive (Epstein, 1995; Grasswick, 2010; Harding, 2015). One analysis of the problem (Moynihan et al., 2019), examines how different organizations, e.g., governments, professional associations, medical journals, etc., are implementing strategies to move away from commercial influence in three broad areas, i.e., research, education, and practice.

More recently, a number of alternative approaches to pharmaceutical research and development (R&D) have emerged, especially in areas of market failure, such as research on neglected tropical diseases (NTDs), establishing public-private partnerships and new communities of collaboration (Lezaun and Montgomery, 2015). Many have argued for a 'delinkage' of the price of medicines, and thus market profitability, from the financial investment in R&D; and different financing mechanisms (such as the so called 'pushing' and 'pulling' strategies) have been proposed and implemented with this goal in mind (Greenberg and Kiddell-Monroe, 2016; Suleman et al., 2020). But are these 'delinking' mechanisms good enough to solve the crisis in medical knowledge today? And if not, how can we improve medical knowledge for global health given the current state of medical R&D?

The aim of the paper is not to provide further diagnosis about the particular factors that have led evidence-based medicine to where it is today, nor to provide an empirical evaluation of the proposed alternatives. Instead, in this paper, I offer an epistemological argument on the crisis in medical knowledge today, first identifying what I consider to be a fundamental problem of the crisis, i.e., what I call the 'epistemic gap', and then introducing the concept of 'pragmatic progress' as a tool for understanding what is needed for pharmaceutical research to solve pressing epistemic and public health problems. This (new) analysis can contribute to identifying at least one mechanism needed to close the epistemic gap in current medical knowledge, which in turn could serve as a criterion for filtering current and future proposals. In other words, thinking about pragmatic progress can help us identify whether or not the strategies found in the literature and described in the previous paragraphs can actually serve the medical knowledge crisis.

The paper in divided in the following sections. In the next section, I question the idea that the free-market provides the best possible framework to produce scientific knowledge, showing instead that the drug market has led to a significant epistemic gap between the knowledge needed to address pressing public health issues and the knowledge produced following the demands of the global market. Once this epistemic gap is understood, the following section examines two competing notions of scientific progress and suggests a new reading of the crisis in medical knowledge, which emphasizes the problems that clinical research is set to solve. The lesson is that for medical knowledge to progress towards public health goals, i.e., to close the epistemic gap, research cannot be set to solve commercial problems primarily, but epistemically and socially relevant ones. Then I move on to present two alternative ways to restructure medical research to fulfill this aim, illustrating how each can be implemented through real-world examples. Last, I address a possible objection to the argument and exemplifies how the criterion can be used to filter undesirable proposals.

The epistemic gap in current medical knowledge

As a result of the pharmaceutical industry's influence in medical research, we currently have a significant epistemic gap between the knowledge needed to address pressing public health issues (by which I mean health problems, such as access to medication and proper treatment, for society's most vulnerable), and the knowledge produced following the demands of the global market. Profitable medical knowledge does not necessarily

coincide with the knowledge needed to improve public health, to combat health inequality, or to prevent health hazards. Expert scholars have repeatedly shown that, contrary to what companies argue, market incentives do not produce better medical knowledge.

To illustrate this point, consider the following three examples. First, market incentives promote the use of placebos instead of the best available therapy in clinical trials, since new treatments are more likely to outperform placebos than outperform the best available therapies, although outperforming placebos does not constitute a real epistemic gain if we already have better therapies (Barbui et al., 2007; Homedes and Ugalde, 2016).

Second, market incentives encourage companies to maintain failed trials and trials with unfavorable outcomes confidential, so that results do not have a negative impact on the marketing process and future profits, although this practice is clearly detrimental from an epistemic point of view, since only a biased portion of the knowledge produced is available and thus no sound conclusions can follow from it (Goldacre, 2012; Wieseler et al., 2013).

Moreover, by exclusively focusing on conducting randomized clinical trials for the production of new drugs, the pharmaceutical industry is completely centered in the evidence-based knowledge paradigm, which only accounts for a partial epistemology of medicine, leaving aside core epistemic issues regarding the causal mechanisms involved in disease development and drug interactions (Solomon, 2015). This is even the case for some of the main alternatives to RCTs. For instance, Adaptive Design Trials (ADTs) have emerged to provide flexibility as a response to market and financial pressures that RCTs have not been able to tackle, leaving untouched, or even worsening, the epistemic limitations of RCTs (Helgesson and Lee, 2017). In a similar vein, Pragmatic Clinical Trials (PCTs), which aim at conducting biomedical research in real-world settings with patients undergoing medical treatments, and thus obtaining results from actual medical settings, have been criticized precisely for not questioning the RCT model as the gold standard for research (Rushforth, 2015).[1]

And these are only three of a myriad of epistemically worrisome practices that Big Pharma has put in place following market incentives (for a summary of other problems see Bero and Rennie, 1996; Moynihan et al., 2019).

Thus, as scholars of science, technology, and medicine have been arguing for some time now (see, e.g., McGarity and Wagner, 2012; Mirwoski, 2013; Whitaker and Cosgrove, 2015) and contrary to what free-market fundamentalists might say (Oreskes and Conway, 2010), market incentives have not rendered better knowledge. Not only because we can easily identify epistemic problems that need to be fix, but also because we can imagine many different ways in which medical knowledge could better address social needs, e.g., by addressing neglected tropical diseases, developing affordable treatments, aiming at de-medicalizing patients, etc; and, more importantly, because we have good examples of alternative frameworks, such as the Mario Negiri Institute or the Cochrane Center, different from the commercial framework, in which the production of medical knowledge does not suffer from the epistemic flaws we find in Big Pharma. Thus, instead of producing better medical knowledge, market incentives have created an epistemic gap between the medical knowledge society needs and the medical knowledge actually being produced.

This epistemic gap becomes even more salient when we examine the attempts at fixing market incentives through democratizing strategies, i.e., strategies to increase citizen participation, make research more inclusive and diverse, or merely taking into account stakeholders, which have been for the most part unsuccessful, as market incentives rapidly corrupt the laudable aims of these strategies. Good examples that illustrate this point are the recruitment of diverse subjects in global clinical trials (Fernández Pinto, 2019) and the way private companies have learned to steer health advocacy organizations (Fernández Pinto, 2018). As it will become clear in the next section, even philanthropic initiatives, such as the Bill and Melinda Gates Foundation (BMGF), with their apparent aim at epistemic redistribution, i.e., procuring medical knowledge for the most needed, fail to keep financial conflicts of

interest at bay (Birn, 2014; McGoey and Thiel, 2018; Fernández Pinto, 2022). In all these cases, strategies to democratize the process of medical knowledge production do not seem to contribute to making research more inclusive or diverse, or even to render better results to treat the more vulnerable. Instead, it seems that market incentives are likely to corrupt the goals of such strategies, which only accentuates the significance of the epistemic gap in medical research today.

Scientific progress as problem-solving

In this paper, I would like to shed a new light on the problems for medical knowledge stemming from the current organization of medical research led by pharmaceutical companies worldwide and guided by market incentives. But first, the analysis requires a small philosophical detour.

Pragmatic progress

Traditionally, scientific progress is understood in terms of achieving or moving towards a general epistemic goal, such as truth or knowledge. However, the idea of science progressing in this sense has been the target of various critiques, among other reasons, because of the linear and cumulative picture of scientific practice and knowledge production that it presupposes.[2] Thomas Kuhn famously opposed this view of science:

> We are all deeply accustomed to seeing science as the one enterprise that draws constantly nearer to some goal set by nature in advance. But need there be any such goal? Can we not account for both science's existence and its success in terms of evolution from the community's state of knowledge at any given time? Does it really help to imagine that there is some one full, objective, true account of nature and that the proper measure of scientific achievement is the extent to which it brings us closer to that ultimate goal? If we can learn to substitute evolution-from-what-we-do-know for evolution-toward-what-we-wish-to-know, a number of vexing problems may vanish in the process. (Kuhn, 1962: 171)

Contrary to the linear and cumulative view of science, Kuhn had in mind a history of deep ruptures in the scientific world view, which he famously called scientific revolutions. However, even with this radically different conception of scientific practice, Kuhn also had an account of scientific progress: not a cumulative view, but an evolutionary one. As he (Kuhn, 1962: 171) says in the previous quote: "Can we not account for both science's existence and its success in terms of evolution from the community's state of knowledge at any given time?"

Here, Kuhn is following the steps of American pragmatist philosopher John Dewey, with whom he shared a naturalist view of scientific progress. For Dewey, progress is pragmatic in character. It is not the transition towards some ultimate goal, but the organized solution to an end-in-view or a problem at hand:

> The aim set up must be an outgrowth of existing conditions. It must be based upon a consideration of what is already going on; upon the resources and difficulties of the situation. Theories about the proper end of our activities (…) often violate this principle. They assume ends lying outside our activities; ends foreign to the concrete makeup of the situation; ends which issue from some outside source. (Dewey, 1915: 112)

For Dewey, the notion of progress in human action is tied to the possibility of improving current circumstances: "The value of a legitimate aim, on the contrary, lies in the fact that we can use it to change conditions. It is a method for dealing with conditions so as to effect desirable alterations in them" (Dewey, 1915: 113). In this account, aims are situated, local, i.e., they respond to contextual practical needs. Accordingly, scientific progress occurs when the research process, which is an organized and ordered process, improves present conditions. Philosopher Philip Kitcher illustrates this kind of pragmatic progress using the example of transport technology:

> Progress in transport technology is not to be understood in terms of decreasing distance towards some ideal goal—there is no ideal system of transportation towards which we are converging—but as progress away from problematic situations: we make progress by solving problems, by introducing or refining devices that fulfill the pertinent functions. (Kitcher, 2012: 316)

In sum, there is a notion of scientific progress stemming from the American pragmatist tradition in which progress is not understood teleologically, i.e., as the movement towards an ultimate goal, but pragmatically or evolutionarily, i.e., as solving a particular problem at hand. I will now use this idea of pragmatic progress to shed light on the epistemic gap of medical knowledge today.

What problems is pharma trying to solve?

The idea of *pragmatic progress* is useful to our purposes because it is closer to current scientific practice, where research projects need to be self-contained and have clearly set goals, achievable in a reasonable amount of time. Pharmaceutical research might be an extreme case of such constraints, where time pressure and well-defined problem-solving guides the whole research process. Accordingly, we can now ask, what problems is pharmaceutical R&D trying to solve?

The question becomes a crucial one because research outcomes directly depend on the problems research is set up to solve in the first place. If the problems that commercialized medicine is set up to solve are fundamentally different from the public health problems one would expect it to solve, then, not surprisingly, research results need not render solutions to the latter. Pharmaceutical research today is a problem-solving enterprise, structured to solve in the most efficient way an array of problems that arise at different stages of the research process. The main problem is how to get a drug quickly into the market to benefit the most from patent-protected revenues. This problem is then meticulously fragmented into smaller efficiency problems along the research process: how to recruit research subjects quickly, how to comply with government regulations, how to design and conduct trials to obtain significant results, how to write and publish scientific papers to get the most recognition and coverage, how to give patients information about diseases and treatment, etc.

The problems are set in a commercial framework and are for the most part commercial in character.[3] If they target any epistemic or social goals, it is only instrumentally, i.e., for the sake of further commercial gain. For example, as some have argued, commercial research can benefit from being methodologically rigorous, given that obtaining good quality results would lead to good quality products that consumers will favor (Carrier, 2009). However, here we can see that solving the epistemic problem is just instrumental to solving the commercial problem. And, as it happens, whenever solving the epistemic problem does not contribute to solving the commercial problem, or when the commercial problem can be solved more efficiently some other way, then the epistemic problem is easily set aside.

A good example is the case of surrogate endpoints in clinical trials. Surrogate endpoints or markers that correlate with real-world outcomes, the true research targets, are frequently used as a substitute during clinical trials. Surrogates are useful for clinical research whenever the real-world outcome is undesirable or when there is a methodological barrier to reading the endpoint (e.g., when trying to prevent heart attacks or death). However, surrogate markers can also render unreliable results, when benefits on surrogate endpoints do not correlate with benefits on real targets. A clear example that illustrates this point is the development of anti-arrhythmic drugs to prevent sudden death after myocardial infarction. Heart arrhythmias post-infraction seemed to increase the risk of sudden death, which led researchers to believe that preventing such arrhythmias, a surrogate marker, would lead to lower the risk of sudden death. As the infamous CAST study illustrates (Echt et al., 1991), preventing abnormal heart rhythms did not correlate with preventing sudden death. Quite the contrary, anti-arrhythmic drugs increased the risk of death and had to be pulled out of the market (Goldacre, 2012: 133). A crucial mistake was made because arrhythmia was used as a surrogate.

Even though the use of surrogate endpoints is a great tool for investigating possible treatments that could not be investigated otherwise, one should not underestimate the difficulty of using this tool appropriately. Among others, a strong relationship between the surrogate endpoint and the 'real' endpoint should be established, as well as the biological plausibility of the causal relation between changes in the surrogate marker and changes in the 'real' marker and a strong biological justification for using

such a surrogate marker (Lonn, 2001). When any of this fail, surrogate endpoints in clinical trials might provide completely mistaken results, as in the anti-arrhytmic drugs case. And even if the surrogate endpoint appropriately correlates with the 'real' endpoint, there is also the risk of unexpected secondary effects that can only be identified in trials specifically designed for this purpose (Lonn, 2001: 504).

Accordingly, if surrogate endpoint trials are carried out without the precautions needed to establish the validity of the surrogate marker as well as its possible side effects, both of which entail strict epistemic conditions, then one would have reasons to claim that the proper epistemic interests of scientific research are being set aside in favor of other, perhaps commercial, interests.

Now, as previously mentioned, it has been widely accepted that there is a crisis in medical knowledge today, and that the current business model for pharmaceutical R&D is less than optimal. Accordingly, a number of strategies have emerged as a response to this challenge. Acknowledging the epistemic gap left behind by the Big Pharma model, philanthropic foundations, such as the Bill and Melinda Gates Foundation (BMGF), Bloomberg, the Clinton Foundation, and the Carso Health Institute, have channelled billions of dollars into biomedical research, have collaborated with governments in low and middle income countries (LMICs) in developing public health initiatives, and have reshaped global health policy and aid (Reubi, 2018). In general, these philanthropic initiatives favor public-private partnerships (PPPs), bringing together international organizations, local governments, pharmaceutical companies, and NGOs (Reubi, 2018). The BMGF, perhaps the most influential of them all, also has the capacity to line up other rich donors to support their biomedical R&D projects overseas (Birn, 2014).

Despite ear-marking R&D that has been left aside by the pharmaceutical market (e.g., research on malaria and other NTDs has been at the front of philanthropic initiatives), these foundations are organized and execute their research plans under a clear business model. They foster PPPs to attract private companies so that they invest in areas in which they would not normally invest. The underlying principle is the same that in the traditional Big Pharma model: the market is infallible, so business models will give us the best solutions to social problems, including global health problems (Birn, 2014: 15). This new wave of philanthrocapitalism (Bishop and Green, 2008; Edwards, 2010) has not detached commercial interests from biomedical R&D but, on the contrary, it has created new commercial incentives for private companies to get involved in these previously neglected areas of research (Birn 2014; McGoey and Thiel 2018). As Birn states, "When PPP benefits such as direct grant monies, tax subsidies, reduced market risk, reputation enhancement, expanded markets, and IP rights are taken into account, the net result is that most PPPs channel public money into the private sector, not the other way around" (Birn, 2014: 14). So in the case of philanthropic initiatives, pretty much as in traditional biomedical R&D, commercial aims are involved in setting research agendas, collaborating with local governments, channelling tax-payers money, opening new markets, etc. The epistemic and social goals of biomedical research get, once again, compromised by commercial interests.

Thus, in order to solve particular epistemic and public health problems, research should be set to achieve those goals, and not other competing commercial targets. So now we have to ask: What are the problems that medical research ought to solve? What should count as medical progress?

Pragmatic progress to improve medical knowledge

The emphasis on the pragmatic progress of science uncovers the close connection between the particular problems research is set to solve and the direction research achievements follow. Hence, it is not coherent to expect research to solve pressing public health issues, as some of us would like, if research is trying to provide solutions to commercial problems. The preliminary conclusion is that in order to achieve pragmatic progress regarding public health issues or particular epistemic problems, research should be set to solve those and not other problems. A corollary of this conclusion is that any attempt at solving the large epistemic and social flaws of commercial medical research today should pay attention

and provide alternatives to the way commercial science operates to solve commercial problems. Solutions that maintain research focus on commercial targets will not render the relevant results. As shown previously, attempts at democratizing science through inclusion of citizens and members of marginalized groups, or philanthrocapitalist initiatives, have failed to achieve progress for public health causes precisely because they have not challenged the commercial goals research is set up to meet.

Now the relevant question is how to organize or structure medical research to solve epistemically and socially relevant problems instead of mainly commercial problems; a task presumably attainable in different ways.

I will not consider radical or ideal scenarios, such as banning for-profit research and supporting medical research exclusively through public funding (e.g., Kitcher, 2001), which have already been questioned for not being realistic enough (Fernández Pinto, 2015) in a world in which the privatization and commercialization of science has been increasing since the 1980s, and where Big Pharma has taken over the market. Instead, I would like to examine alternative ways of conducting medical research, which have already proved to be viable or have been proposed for implementation in real world scenarios. Pragmatic progress to fulfill public health goals does not need to come from big structural changes in the current organization of science. Given that pragmatic progress is achieved through solving localized problems, research can be set to solve these problems in a localized manner.

Alternatives can be divided into two main groups. First, strategies to reorganize parts of medical research without commercial goals in mind, locally encouraging research that is not for profit. An example of this type of strategy is the Drugs for Neglected Diseases Initiative (DND*i*). Second, strategies to change the financial scheme of drug development, so that commercial profit is not directly tied to commercial problem-solving. An example to illustrate this case is the Health Impact Fund (HIF). Both types of strategies have something in common: they try to change financial incentives to protect public health problem-solving from commercial diversions. Shifting financial incentives to other places in the research process, breaks the link between the cost of research and the profitability of the end product. Accordingly, money is no longer tied to commercial problem-solving during the research phase, and local public health and epistemic issues can be prioritized.

Before reviewing how these strategies have been implemented, let me clarify that my aim is not to directly defend the examples that follow. As many other proposals to counteract the epistemic gap in medical knowledge, they have different pros and cons. My aim is rather to emphasize the way in which both examples break the link between the research process and the solution of commercial problems. This is the particular feature I am interested in here.

The Drugs for Neglected Diseases Initiative (DNDi)

The Drugs for Neglected Diseases Initiative is a good example of how medical research can be reorganized to target public health goals without commercial interference. This patient's need-driven initiative seeks to improve the quality of life and health of people suffering from NTDs, such as hepatitis C, Chagas diseases, sleeping sickness, and leishmaniasis, and of neglected patients, such as those suffering from malaria and pediatric HIV. DND*i* seeks to develop new drugs or new formulations of existing drugs in collaboration with the international scientific community (DND*i,* 2014). Focusing on neglected diseases and patients, allows DND*i* to target localized populations and specific diseases, delimiting the public health problems medical research is set to solve.

An initiate from Médecins Sans Frontières (MSF), the DND*i* was established in 2003 to fill a research gap in the drug market, where less than 1.1% of new drugs were approved for the treatment of neglected diseases (Trouiller et al., 2001). Given that drug development for neglected diseases was particularly unattractive for Big Pharma, the DND*i* was a welcomed alternative R&D model for solving major public health problems in low and middle-income countries. More than a decade later, DND*i* has become a game-changer in the fight against NTDs:

> Within 10 years and with a budget of approximately EUR 182.5 million, the initiative has delivered six new treatments for neglected diseases and established a solid drug development pipeline, including 12 new chemical entities (NCEs) in preclinical and clinical development. Over 350 collaborations in 43 countries, including nearly 20 pharmaceutical and biotechnology companies, and over 50 universities and research institutes have been put into action. (DND*i,* 2014: 2)

DND*i* depends on both public and private donations to finance their projects. Donations go to an unrestricted core fund, which is then allocated to specific projects after a careful decision-making process, which requires the approval of a Scientific Advisory Committee. The independence of the organization is balanced through a diverse pool of donors, ensuring that no one contributes over 25% of the overall funding (DND*i,* 2006). In this sense, the DND*i* is an example of a "push mechanism" in which direct funding for biomedical R&D is given in advance to incentivize treatment development in areas of limited commercial potential (Suleman et al., 2020).

DND*i* collaborates with a number of research partners, including pharmaceutical and biotech companies, universities, research institutes, government organizations, and CROs. In this sense, it follows the PPP model. However, given the organization's goal of addressing urgent patient needs, collaborations require licenses that are royalty-free, sub-licensable, and non-exclusive, while guaranteeing worldwide coverage and disclosure of information (DND*i,* 2014: 4). In this way, DND*i* negotiates directly with partners to ensure that IP is not used to obstruct affordable access or further research. Breaking the link between commercial revenue and research development, DND*i* has been able to reorganize medical research, shifting the financial incentives to upfront contracts, and prioritizing public health problem-solving at the research stage.

A tangible example of the DND*i* model was the development of the artesunate-amodiaquine combination therapy for the treatment of malaria, ASAQ Winthrop, commercialized as Coarsucam™ by the pharmaceutical Sanofi-Aventis at $1 per treatment in 2007 (Cassier, 2021). A year later, in 2008, ASAQ received a prequalification by WHO and became available for production by generic manufacturers (Lezaun and Montgomery, 2015). ASAQ was the result of the Fixed-Dose Artesunate Combination Therapy (FACT) consortium, established by the DND*i* in 2002 with the goal of developing new pharmaceutical technologies for the treatment of malaria, and which included Farmanguinhos/Fiocruz (Brazil), Tropival of the Bordeaux II Victor-Segalen University (France), Oxford University (UK), Universiti Sains (Malaysia), Mahidol University (Thailand), the Special Programme for Research and Training in Tropical Diseases WHO/TDR (Switzerland), and the Centre National de Recherche et de Formation sur le Paludisme (Burkina Faso) (Bompart et al., 2011). Funding for FACT came from the European Union, the Agence Française de Développement, the Swiss government, and philanthropic organizations, primarily MSF and the DND*i*. The pharmaceutical Sanofi-Aventis stepped in later on for the industrialization and registration process, as well as the completion of the clinical trials, which were initiated by the FACT consortium (Cassier, 2021: 334-335).

Sanofi-Aventis agreed not to file a patent on the results of the collaboration, in exchange of market exclusivity before registration or WHO prequalification, which came only after one year. Sanofi-Aventis also agreed to pay the DND*i* 3% of market profits in the private sector for a period of seven years, a revenue that the DND*i* decided to invest in a Risk Management Plan for ASAQ. In addition, to ensure that those who most needed the malaria treatment had access to the new medication, the agreement also established a low price to market of US$1 for an adult treatment and US$0.5 for a child's treatment in the public sector (Bompart et al., 2011).

For our purposes, the crucial part in this case is the fact that Sanofi-Aventis agreed to produce and market a treatment without patent protection and extreme price control. In this way, the DND*i* was able to break the link between biomedical R&D and commercial revenue. For sure, most of the initial investment came from public sources (51%), a good amount also came from MSF and the DND*i* (32%), and only a small portion came from the industry (17%) (Cassier, 2021). But precisely because the main initial investment and risk was

not carried by the pharmaceutical company, this PPP allowed the DND*i* to successfully develop a much needed biomedical treatment and make it accessible to patients in LMICs.

The Health Impact Fund (HIF)

The Health Impact Fund illustrates a second strategy to achieve pragmatic progress towards public health goals in medical research. Unlike DND*i*, HIF does not get rid of potential commercial profit from medical research, but shifts commercial interests to another place of the drug development process to break the relation between patent protection and future profit. One of the main goals of the HIF is to reward companies for the actual social impact of the treatments they develop, or what they call a "pay-for-performance mechanism".[4] In this sense, the HIF is an example of a "pull mechanism," in which rewards are delivered after certain milestones or goals are achieved, normally some time after a treatment hits the market (Suleman et al., 2020).

The basic idea behind the HIF is to create a fund, supported by national governments, with a fix sum of money per year (the initial suggestion is 6 billion dollars). Pharmaceutical companies and other drug developers can choose between the traditional drug market or registering with HIF, which would make them eligible for HIF rewards during a ten-year period. Rewards are set as a percentage of the fund and will be proportional to the health impact of the registered treatment. Health impact will be assessed according to a unified measure, such as the Quality-Adjusted Life Year (QALY) or the Disability-Adjusted Life Years (DALY), but the process is open to better indicators when available. Payments are also sensitive to increasing improvements compared to alternative treatments, ensuring that new drugs are evaluated against the best available treatments. In return, drug developers are required to sell their product at the cost of production, wherever is needed, and to sublicense the patents to generic manufacturers after the ten-year reward period (Pogge, 2011).

The HIF seeks to incentivize medical research for health treatments suffered by patients in LMICs, who cannot afford medications at a high price, while securing financial incentives for pharmaceutical companies:

> This approach will make it profitable to develop medicines for heretofore neglected diseases as well as medicines with global impact. And these medicines will be sold at low prices all over the world, while still generating a return for the shareholders of innovative pharmaceutical companies. (Incentives for Global Health, 2008: 3)

Even though the HIF strategy does not eliminate commercial interests, it is after all a "market-based solution," it ties profits to the treatment's overall health impact, while mainiting prices at cost of production and ensuring the possibility of generic manufacturing after ten years, thus prioritizing both accessibility of treatments for the most vulnerable and the proper solution of public health problems. In other words, "The HIF instead promotes a system in which competitors are rewarded based on their success in fixing a problem of global social injustice" (Botti, 2013). Pharmaceutical companies have an incentive to register with the HIF particularly in the development of treatments for the diseases that disproportionally affect patients in LMICs, who are not able to afford high medication prices. In this way, the HIF seeks to contribute to ameliorate the global burden of disease.

As with the DND*i*, the HIF breaks the link between biomedical R&D and direct commercial revenue from prices. According to Towse and his colleagues, the HIF works as other "pulling" strategies in that: "underlying this proposal is the idea that the cost of R&D should be 'de-linked' from the price of the product." However, the HIF differs in that rewards are tied to patients' health outcomes: "A prize fund would again be used as the 'draw' from innovation, but in this case the developer would not be rewarded until it could demonstrate that the resulting product has health value for the intended patients" (Towse et al., 2011: 327). In this particular way, the HIF would be able to break the link between R&D and revenues from pricing, while securing low prices and epistemic success (i.e., actually evaluating whether the treatment is medically successful and better than other available therapies). In other words, the HIF presents a mechanism that ensures we attain the

medical knowledge we need to face global health problems.

In sum, strategies to restructure medical research in order to prioritize public health problems instead of prioritizing commercial interests exist and have been implemented in different ways (for a survey of alternatives to biomedical R&D, see Kiddell-Monroe et al., 2016; Greenberg and Kiddell-Monroe 2016). Some strategies, such as DND*i*, reject the commercial development of medical treatments and instead support a non-for-profit patient-centered framework. Other strategies, such as the HIF, work within the global drug market to incentivize research on treatment that are not particularly attractive for pharmaceutical companies. Both of these strategies shift the place of financial incentives to avoid conflict with solving public health problems, so that these can be prioritized in the research process, fomenting pragmatic progress towards public health goals.

Notice also that the fact that these strategies work as "pulling" or "pushing" mechanisms is not really important for our purposes. Pushing or pulling strategies can be implemented to serve epistemic and social goals as much as they can be implemented to serve commercial goals. What is important here is the fact that both the DND*i* and the HIF are able to break the link between R&D and revenues from pricing, thus prioritizing the search for the relevant knowledge to serve public health goals.

Pragmatic progress as a filter for large scale proposals

Both of the strategies examined in the previous section are local, and target specific types of medical issues related to tropical neglected diseases or health conditions that affect low and middle-income countries. Some might argue that these strategies can only work in parallel with the neoliberal organization of pharmaceutical research, insofar as they have searched for gaps in the market and played with financial incentives precisely where pharmaceutical companies are not interested to invest. However, the argument goes, they do not deal with the core of the crisis in medical knowledge, since they do touch the pharmaceutical market in high income countries, where most revenues come from.

The argument is right that none of these strategies aims to restructure pharmaceutical research in the large scale, and thus they do not present a complete alternative to current biomedical R&D (Greenberg and Kiddell-Monroe, 2016). However, by reorganizing research incentives to find treatments relevant the most vulnerable, who for the most part live in LMICs, both of these strategies built bridges to close the epistemic gap in current medical knowledge. As a result, real solutions to pressing health issues are developed, addressing a core aspect of the crisis.

Furthermore, the general reading of the crisis in terms of the pragmatic progress of research offers a clear criterion to evaluate whether possible strategies to reorganize pharmaceutical research to assess global health needs are promising or not. If proposed strategies maintain the link between the research process and the solution of commercial problems, we have good reasons to believe these strategies will not prioritize public health issues in the long run. If, on the contrary, strategies break the link, they would seem more promising.[5]

Even if the criterion does not suggest an actual solution, it proves useful to filter proposed strategies. I have already shown two promising strategies that pass the filter. Now let me show a negative case. MIT professors of financial engineering, José María Fernández, Roger Stein, and Andrew Lo (2012), have made a bold proposal to restructure the financial schemes in pharmaceutical research through securitization techniques. The proposal consists in creating a Megafund (3-15 billion dollars), funded through capital markets by securitized debt and equity, including low-risk bonds with a 5-10% annual revenue, attractive to venture capitalists, but also to pension funds, 401ks, and the like. The Megafund will provide capital to pharmaceutical companies in exchange for returns similar to a diversified debt portfolio: high risks from investments with low chance of success will be minimized by a sufficiently diverse and large portfolio, where the chance of one drug to be successful is high (The Economist, 2013). In this way, the risks involved in pharmaceutical research will not be taken by pharmaceutical

companies, but absorbed by capital markets. Pharmaceutical market failures and successes would balance each other out.

In the aftermath of the financial crisis where securitization techniques dramatically failed, the Megafund has received serious critiques. But without getting into the financial objections, we already have a good reason to believe that the Megafund will not address public health issues as expected. Even though the proposal shifts financial risks from pharma companies to markets, financial incentives remain tied to the research process, since only treatments that prove to be successful in the market will pay off. Accordingly, pharmaceutical research is still linked to solving commercial problems tied to efficiency: recruiting research subjects quickly, designing and conducting trials to obtain significant results, writing and publishing scientific papers to get the most recognition and coverage, and so on. Not surprisingly, solving public health problems is not likely to be a priority in this scheme. The expected progress is not appropriately directed, and thus the proposal does not pass the filter.

Conclusion

The aim of the paper was to offer an epistemological argument on the crisis in medical knowledge today, specifically in clinical research controlled by the pharmaceutical industry. In order to do so, I first identified a fundamental problem of the crisis, i.e., the 'epistemic gap' that the current globalized privatization of biomedical R&D has left. I then introduced the concept of 'pragmatic progress' as a tool for understanding what is needed for pharmaceutical research to solve pressing epistemic and public health problems. I concluded that we need to find alternatives to biomedical R&D financialization which stop prioritizing the solution to commercial problems, and instead clearly prioritize epistemic and public health problems. While this can be achieved in different ways, the fourth section examined two alternative strategies, illustrated by the DND*i* and the HIF, which have already been considered in the current global medical market. The last section addressed a possible objection to the proposed reading, and showed how the concept of 'pragmatic progress' can be used to evaluate and discard proposals for restructuring pharmaceutical research.

In this way, I aimed to show that the concept of pragmatic progress can be used as a tool for evaluating when a proposed alternative truly contributes to the delinkage of investment in biomedical R&D from commercial profit, thus prioritizing the solution to epistemic and public health problems over commercial ones. Accordingly, the main contribution of the paper can be understood as hermeneutical in character, exploring new conceptual resources for understanding the crisis of medical knowledge today and providing guidelines to move forward. In this sense, the paper aims to contribute to a growing literature in the social studies of science and technology which focuses on the epistemic dimensions of the globalized privatization of science, including the practices of ignorance production that neoliberal strategies in biomedical research are encouraging (see, e.g., Sismondo, 2009; McGarity and Wagner, 2012; Mirowski, 2013; Gross and McGoey, 2015; Whitaker and Cosgrove, 2015). More, however, still needs to be said about how the concept of pragmatic progress can illuminate such issues.

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Appendix 1. Abbreviations

BMGF: Bill and Melinda Gates Foundation
CAST: The Cardiac Arrhythmia Suppression Trial
CRO: Contract Research Organization
DALY: Disability-Adjusted Life Years
DND*i*: Drugs for Neglected Diseases Initiative
FACT: Fixed-Dose Artesunate Combination Therapy
HIF: Health Impact Fund
LMICs: Low and Middle Income Countries
MSF: Médecins Sans Frontières
NCEs: New Chemical Entities
NGO: Non-Governmental Organization
NTDs: Neglected Tropical Diseases
PCT: Pragmatic Clinical Trial
PPP: Public-Private Partnership
QALY: Quality-Adjusted Life Year.
RCT: Randomized Controlled Trial
R&D: Research and Development

Notes

1 Pragmatic Clinical Trials are called "pragmatic" for being conducted in the midst of medical practice with patients who are undergoing medical treatment and teams (doctors, nurses, and administrators) who are embedded in medical settings. In this sense, PCTs can be understood as cross-disciplinary fostering the co-construction of medical knowledge (Rushford, 2015: 1286). Despite their flexibility and their goal of conducting research in more realistic scenarios, most PCTs follow the basic methodological structure of RCTs. Even though there is a similarity in the sense in which these trials are "pragmatic" and the "pragmatic" progress I argue for in this paper, insofar as both refer to practical and not idealistic or abstract aims, PCTs should not be considered necessarily conducive to pragmatic progress just because of this terminological overlap.

2 The literature on scientific progress is large and goes beyond the scope of this paper. For those interested in the philosophical debate, see Laudan (1977), Douglas (2014), and Niiniluoto (2015).

3 Some have characterized this broader framework as the *financialization* of pharmaceutical R&D. Epstein defines financialization as "the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies" (Epstein, 2005: 3). This financialization certainly defines the structural conditions and logical possibilities for pharmaceutical R&D today. Special thanks to one anonymous reviewer for pointing out this connection.

4 To date, the HIF has not been implemented, but a pilot of the program has been designed. Accordingly, we do not have real examples of drug development by the HIF. For more information, see: https://healthimpactfund.org/pdf/HIF_pilot_proposal_2019_11.pdf

5 Notice that I am not denying the possibility that commercial and social interests align in ways that are both profitable and socially beneficial. The development of antiretroviral drugs for the treatment of HIV (Epstein, 1995), and even the recent development vaccines for the treatment of COVID-19 could be seen as examples of such alignment (Fernández Pinto 2023). However, the vast amount of evidence showing the corrupting effects of commercial interests in medical research (for a good summary see, Moynihan et al., 2019) clearly give us good reasons to favor breaking the link between the research process and the solution of commercial problems.

Evolutionary Psychology and the Naturalization of Gender Inequalities

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Abstract

This article explores the uses of evolutionary psychology in a corpus of 29 articles published by the online magazine *Quillette*. We show that while they openly rely on a rationalist, descriptive stance, *Quillette* contributors actively promote a range of normative views on science and the social world, including gender inequalities, with the stated goal to question the so-called "left-wing" and "blank slate" orthodoxies. In so doing, this magazine participates to the development and diffusion of a conservative meritocratic frame that strongly resembles the self-legitimizing discourses put forth by socially dominant groups, only in a naturalized form.

Keywords: Evolutionary psychology, *Quillette*, naturalization, science, conservatism

Introduction

In recent years, social scientists from many countries around the globe (from Japan to Brazil, to France, Denmark and the United States) have experienced organizational and existential threats from conservative politicians (Andersen, 2022; Bourdieu et al., 2022; Kingston, 2015; Moody, 2024). While we may be accustomed to think of these threats as "external" to academia, the legitimacy of social science is also attacked, sometimes fiercely, from within the scientific field itself. Evolutionary psychologists and behaviour geneticists have thus been very vocal about their disapproval of "standard" social science for a few decades (Cassidy, 2006; Panofsky, 2014). While this critical stance is not new, it has recently found some fresh and important relays in non-academic circles as well. *Quillette*, an online magazine established in 2015, is one of them: it articulates a critique of social science with a denunciation of the so-called "liberal bias" that is supposed to be prevalent in academia (Larregue, 2018). As explained by its founder Claire Lehmann, an Australian journalist with a degree in psychology, by "setting up a space where we could critique the blank slate orthodoxy," *Quillette* "has naturally evolved into a place where people critique other aspects of what they see as left-wing orthodoxy" (Lester, 2018).

We are, of course, not the first to document the relationship between evolutionary ideas and conservative ideologies (Jackson and Rees, 2007;

McKinnon, 2006; Meloni, 2016). Despite their overt criticism of religiosity and a secular reading of Darwinism (Shapin, 2010), Dorothy Nelkin (2010: 15) acutely observed that evolutionary psychologists exhibited a religious impulse, regularly embracing the role of "missionaries bringing truth to the unenlightened", not least when "they claim their theories are guides to moral action and policy agendas". In this article, we add to this literature by asking how evolutionary ideas are leveraged to promote certain views of the social world (be they scientific, political, moral, ethical, etc.) while criticizing what are branded as alternative narratives? More specifically, we focus on two interrelated aspects: a) how evolutionary psychology is promoted as a "good", or even sometimes a "better" science, and thus offered as a complementary and/or alternative discourse to claims and interpretations attributed to "leftist" social scientists; b) how the evolutionary psychology scholarly corpus and evolutionary gaze is leveraged and used as a rhetorical resource in the practical discussion of social problems, including gender inequalities.

Before going further, let us emphasize that we are *not* arguing that all evolutionary psychologists share identical political views, nor that the scientific productions in this field are homogeneous and thus amenable to definitive conclusions. As demonstrated by previous research, the best definition for, and limits of evolutionary psychology are notoriously difficult to identify (Larregue et al., 2021; Cassidy, 2006: 186), and the aim of this article is not to propose an exhaustive inventory of the whole field of evolutionary psychology. What we do contend, however, is that evolutionary arguments are used by *Quillette* contributors to promote certain views of the social world, and that these views are not politically neutral.

Methods and data

To analyse this language and its various uses, we built a corpus of *Quillette* articles where evolutionary theory was central to the authors' argument. We performed a search on www.quillette.com with the help of the built-in search tool, using the keywords "evolutionary psychology" (without quotation marks)[1]. The search initially returned 152 items published between May 2015 and May 2021, most of them being articles, while just a few were reviews, editorials, etc. We then performed a filtering of the results, as some articles did not have any relationship with evolutionary theory. To do that, we read the articles and used a four-label classification system, each item receiving a number between 0 and 3 depending on the importance that evolutionary theory occupied in the text:

- Label 0: there is no reference whatsoever to evolutionary theory or only in the paratext. For example, when the word "evolutionary" appears in the biography of the author, or when the specialty of a professor of evolutionary psychology is mentioned in the text although (s)he is interviewed on a topic that is not related to evolutionary theory. 41 items were labelled 0.
- Label 1: evolutionary theory barely appears in the text or as a secondary argument. In this case, evolutionary psychology will seldom be mentioned (see for instance Winegard and Winegard, 2019) or only as a rapid argument (see for instance Miller, 2019). 52 items were labelled 1.
- Label 2: evolutionary theory is one of the arguments of the text but without being predominant. The importance of such an argument is assessed based on the position of the argument in the text and its recurrence. A typical example would be an article where evolutionary psychology is addressed in one or two paragraphs (see for instance Anomaly and Boutwell, 2017). 30 items were labelled 2.
- Label 3: evolutionary theory is either central in the argumentation, or even sometimes the core of the article. This would be the case of a paper advocating for the use of evolutionary theory in anthropology (see for instance Blackwell, 2018), or of an article entirely devoted to evolutionary psychology (see for instance Flock, 2018). 29 items were labelled 3.

Although it was sometimes difficult to distinguish between categories 1 and 2, the classification has been made so that this issue would not impact the identification of category 3: there is absolutely no doubt that these later articles involve evolu-

tionary theory as a central component. Another difficulty has been met when classifying articles dealing with broader biological arguments (such as behavioural genetics), without an explicit mention of evolutionary theory. Such articles would not be labelled 3 but at most 2, thus ensuring that the category of articles labelled 3 are directly dealing with evolutionary theory. To be clear, this does not mean that the expression "evolutionary psychology" appears in the text *per se* (it appears in 13 out of these 29 articles), but that an evolutionary approach to human behaviour is central to the arguments laid out in the article.

Our close reading of the 29 articles was geared toward the way evolutionary ideas are used to address questions relating to social inequalities, especially at the gender level. This close reading allowed us to identify and analyze the type of evolutionary arguments and ideas that *Quillette* contributors resort to in their discussion of social science and social inequalities. We were particularly attentive to 1) how what "is" becomes normalized and reconfigured as what "ought" to be, and 2) how evolutionary psychology was used to prognosticate the future, and reproduction of, social inequalities.

Quillette: "a platform for free thought"

Quillette is an online magazine that was founded in October 2015 by Australian journalist Claire Lehmann. After graduating in psychology from the University of Adelaide in 2010, she initiated a move towards the journalistic field and started writing op-eds for several Australian journals such as the *Sydney Morning Herald* or *Rebel Australia*. She claims that she felt the need to create *Quillette* after feeling that she was blacklisted from Australian media because of her heterodox political views: "I particularly wanted to criticize feminism, and I couldn't get published in the Australian media if I was critical of feminism... I was blacklisted." (Lester, 2018).

From the beginning, the magazine designed an editorial line characterized by its scientific anchoring and free speech. It was thought of as a platform where authors – mostly academics – could write in an accessible way about human nature and its evolutionary roots, against standard social science and their political allies: "*Quillette* is a platform for free thought. We respect ideas, even dangerous ones. We also believe that free expression and the free exchange of ideas help human societies flourish and progress. *Quillette* aims to provide a platform for this exchange."[2] The magazine, sitting at the margin of academia, thus appears as a buffer zone where academic and non-academic alike can develop a shared language. Like Thomas Medvetz's (2014: 294) depiction of conservative think tanks, *Quillette* is "neither purely academic nor anti-academic", but a "constitutively hybrid [creature] that [functions] by assembling mixed bundles of institutionalized resources."

The scientific and political orientation of *Quillette* is not left to chance. Half of the articles proposed by the magazine are commissioned – and retributed 400 Australian dollars (Lester, 2018) – the other half being selected among voluntary submissions. One of the first contributors included Brian Boutwell, a US-based criminologist who has been instrumental in the contemporary renewal of biological theories of crime (Larregue, 2024: 83), and who actively collaborates with self-proclaimed "conservative criminologists" John Paul Wright and Matt DeLisi (2015). Since then, the contributions have often offered a conservative or libertarian viewpoint on various aspects of the so-called 'free speech wars' (Riley, 2020).

After a timorous commencement, the notoriety of the website skyrocketed when, in the summer of 2017, *Quillette* published an article grounded on evolutionary theory (Quillette Magazine, 2017) to defend engineer James Damore, the author of the infamous *Google* memo that proposed to explain unequal professional achievements between men and women by biological factors. While this intervention alone cannot explain *Quillette*'s growing visibility, it is clear from the number of *Twitter* followers of the magazine that it constituted a stepping stone: in March 2017, *Quillette*'s Twitter account had 6,932 followers; in September 2017, it reached approximately 15,500. It then continued to grow exponentially: in January 2019, 121,000 accounts were following *Quillette*; in August 2021, it had more than 215,300 followers.[3]

As it became a prominent outlet, *Quillette* also expanded its editorial team as of summer

of 2021. Apart from Claire Lehmann, there are now three other paid editors, coming either from the journalistic field, the cultural field or from the scientific field, each representing a different English-speaking country: Jonathan Kay, a former tax lawyer, who has been a journalist in Canada since the late 1990s; Jamie Palmer, a former documentary film-maker who graduated from Dublin Institute of Technology; Colin Wright, who obtained a PhD in evolutionary biology from the University of California Santa Barbara in 2018. The influence of *Quillette* is, however, not restricted to these countries. In France for instance, articles published in the magazine have begun to be translated and published in *Le Point*, a weekly magazine standing at the right of the political spectrum.

Disguised as science? The evolutionary critique of "standard social science"

Before delving further into the uses of evolutionary psychology in *Quillette*, it is important to provide some context on the development of this field as well as on its positioning vis-à-vis the rest of the social sciences. In this section, we investigate evolutionary psychologists' boundary-work vis-à-vis what they call "standard social science," that is the way key representatives of this movement attempt to "[construct] a social boundary that distinguishes some intellectual activities as 'non-science'" (Gieryn, 1983: 782).

From the late 1980s on, many evolutionary psychologists – including representatives of the so-called Santa Barbara school – presented their field as a reaction to social science, which was deemed immature, pseudoscientific, and intellectually bankrupt (Cassidy, 2006). According an oft-heard narrative, the only way to break out of this alleged isolationism and anti-scientific positions would be to embrace adaptationist views of human behaviour (Larregue et al., 2021). *Quillette* can in this regard be analysed as the logical continuation of a rhetorical strategy that crystallized in the early 1990s, when the movement of evolutionary psychology gradually became identifiable through the boundary-work that its main proponents exerted on two fronts: vis-à-vis previous evolutionary understandings of human behaviour, including sociobiology, but also with respect to non-evolutionary social science (Larregue et al., 2021; Cassidy, 2006). When it comes to the latter, such boundary-work has notably materialized in the adoption of pejorative labels supposed to convey the irreducible limitations of "traditional" sociology, anthropology, and psychology. Two expressions, in particular, have been instrumental in evolutionary psychologists' boundary-work, becoming a rallying sign for like-minded scholars who wished to break away from what they perceived as ideologically oriented research.

The first one, 'Standard Social Science Model', was coined by John Tooby and Leda Cosmides (1992) in a 118-page programmatic essay published in a collective, foundational book from the early 1990s (Barkow et al., 1992). Superficially referring to Durkheim's *Les règles de la méthode sociologique* (among other classical landmarks), Tooby and Cosmides go on to argue that the social sciences have promoted a culturalist view of human behaviour that denies any explanatory role to biology, which resulted in theoretical isolationism. To be clear, any historian of the social sciences will realize that this narrative is factually incorrect. For instance, in his classic *Division of Labour in Society*, Durkheim (1984: 21) explicitly lends support to the hypothesis of brain differences between men and women. Prominent representatives of the Chicago school were also actively promoting eugenicist ideas in the early 20th century. In fact, when Robert E. Park and Ernest Burgess (1921) edited and published *Introduction to the Science of Sociology*, the "first highly visible textbook of American sociology" (Morris, 2017: 19), they decided to reprint one of Galton's writings ("Eugenics as a Science of Progress").

Despite this unambiguous evidence, evolutionary psychologists generally prefer to assume that social scientists have rejected "biology" to embrace extremist views of human nature. This, in turn, is said to have caused their stagnation since the beginning of the 20th century:

> After more than a century, the social sciences are still adrift, with an enormous mass of half-digested observations, a not inconsiderable body of empirical generalizations, and a contradictory stew of ungrounded, middle-level theories expressed in

> a babel of incommensurate technical lexicons. [...] We suggest that this lack of progress, this 'failure to thrive,' has been caused by the failure of the social sciences to explore or accept their logical connections to the rest of the body of science – that is, to causally locate their objects of study inside the larger network of scientific knowledge. (Tooby and Cosmides, 1992: 23)

As summarized by Angela Cassidy (2006: 193), "What emerges from [this] piece is less of an attack upon all social science per se, than a critique of interpretive and qualitative approaches to social and psychological research." As this critique was further developed and extended across the years, it also gained traction in the public sphere. Hence, ten years after Tooby's and Cosmides' academic chapter, psychologist and linguist Steven Pinker (2002) follows up with the critique of social science that he had already initiated in previous publications (Cassidy, 2005: 127–130) by publishing a highly influential essay that would be a finalist for the Pulitzer Prize: *The Blank Slate: The Modern Denial of Human Nature*. The blank slate metaphor refers to theories of mind postulating that individuals are born without integrated mental content, and therefore that all human knowledge or behavior comes from the experience or from learning. In his eponymous essay, Pinker follows the path opened by Tooby and Cosmides, accusing social sciences of denying the possibility of behavioral innatism. But while Tooby and Cosmides (1992: 49) barely touched upon politics and designed their intervention as purely academic, Pinker widens the frame and clears the path for a different sort of examination: by connecting the critique of social science to the critique of political 'egalitarianism' (Pinker, 2002: 22), scientists, activists and politicians alike are brought together under the banner of a shared 'sacred scripture' (Pinker, 2002: 6).

Quillette's recuperation of the blank slatist rhetoric

This weaving is now furthered through *Quillette*'s editorial line, which largely pursues Pinker's effort in widening the evolutionary authorship and readership. A close analysis of our corpus of 29 articles demonstrates that the blank slate expression became a convenient label for attacking both social scientists and left-leaning ideologies: we were able to identify 18 occurrences of '"blank slate" and derivative expressions such as "blank-slatism" (Willoughby, 2017) and "blank slater" (Chipkin, 2019). Conversely, the expression "Standard Social Science Model" could not be found, which testifies to the structuring importance of Pinker's book. It is evolutionary psychologists' position that "blank-slatism" is a marker of irrational and unscientific ideology, which leads some *Quillette* authors to compare social science with "anti-vaccine rhetoric", "climate change denial" and "creationist Christians" (Willoughby, 2017). Likewise, Colin Wright (2018), an evolutionary biologist (now a managing editor at *Quillette*) who specialized in the "social behavior of ant, wasp and spider societies", goes on to argue that

> the social justice stance on human evolution closely resembles that of the Catholic Church. The Catholic view of evolution generally accepts biological evolution for all organisms, yet holds that the human soul (however defined) had been specially created and thus has no evolutionary precursor. Similarly, the social justice view has no problem with evolutionary explanations for shaping the bodies and minds of all organisms both between and within a species regarding sex, yet insists that humans are special in that evolution has played no role in shaping observed sex-linked behavioral differences. (Wright, 2018)

These comparisons are suggestive of the uses of evolutionary theory in *Quillette*. The same way that "Darwin Day[4] is less about a historical figure than an occasion for extending versions of scientific materialism and rationalism to ever new cultural domains" (Shapin, 2010), accusations of "blank slatism" are less about scientifically discussing the theoretical inscription of contemporary social sciences than an occasion for extending the evolutionary dominion and, through it, a particular conception of humans. Sociology stands as one of the favourite targets for this somewhat aggressive boundary-work: the word "sociology" and its derivatives appear 58 times in the corpus.

The most representative article of this production is authored by Brian Boutwell (2017), a biosocial criminologist mentioned earlier. In an

article transparently titled *Sociology's Stagnation*, Boutwell claims that sociology's alleged denial of genetic influence on behaviours makes it no different than religion. According to him, sociology is characterized by a hermeticism to biology and psychology, which is due to the maintenance of "sacred values" upon which the field was built. Hence, the best that can happen to this "intellectually bankrupt" discipline is to turn its head toward the biological enlightenment brought about by "population genetics, psychology, epidemiology, and evolutionary biology" (Boutwell, 2017).

From "inequalities" to "differences": normalizing gender inequalities in science

Explaining social inequalities by turning them into *biological* inequalities is instrumental in the formation of *Quillette*'s evolutionary discourse. More than class inequalities, gendered disparities in the distribution of economic capital (Bessière and Gollac, 2020) are the primary focus of evolutionary psychological writings. In this section, we shall expose the back-and-forth movements between evolutionary psychology as a science and evolutionary psychology as a sociodicy[5] that legitimates inequalities between binary, reified groups (men and women).

To understand evolutionary psychologists' views on the topic, it must be stressed that scholars in this area consider that since differential gene reproduction from one generation to another is the evolutionary process that is most subjected to natural selection, the psychological mechanisms pertaining to mating and reproductive behaviours must also be strong targets of selection. It thus comes as no surprise that evolutionary psychologists consider most courtship, mating and parenting gender specific behaviours as evolutionary strategies originating in biological factors (Buss, 2019). However, what is of particular interest for us is that they also extend the scope of this explanation to many, if not most gendered differences in behaviour, with the consequence that "[t]he entirety of human social life is made reducible to the heterosexual, reproductive imperative" (Jackson and Rees, 2007: 918). This can be illustrated by an article written by a then predoctoral researcher in neuroscience. In *Why Feminists Must Understand Evolution*, Marta Iglesias (2017) outlines a causal pathway that begins with the differing degree of investment in reproduction between men and women, to the contrasted nature of sexual competition between the sexes, to end up with the explanation of cultural practices:

> These differences [in reproduction and sexual competition] manifest as the differences we observe in our daily lives: from the toys we prefer when we are small to the products we consume when we are adults; from the tendency to be the object of bullying or its perpetrator to the likelihood of causing a traffic accident; from the posture we adopt when we sit in the underground to the importance we attach to career status. (Iglesias, 2017)

This quote illustrates how evolutionary psychology can be used to naturalize differences that most social scientists would attribute to different upbringing and social dynamics. Another common example of this approach lies in the different prevalence of violent behaviours among men and women, which are attributed to evolutionary forces (Buckner, 2018). Of course, it does not necessarily follow from such hypotheses that gendered behavioural differences, although biologically "normal," cannot be altered through policy efforts, which is made perfectly clear in these two articles. For instance, Buckner (2018) argues that while "homicide and warfare are very much 'natural' behaviors, often tied to male fitness interests," they still are "sensitive to socioecological cues, and their prevalence can vary significantly across and within societies." Yet, while endeavouring to establish a common ground where nature and culture could meet and mesh, it remains that "Such accounts locate gender and sexuality firmly in the realm of the natural sciences and sideline the social and the cultural as mere modifiers of innate proclivities" (Jackson and Rees, 2007: 918)

Some authors go further than merely sidelining social processes, however, using evolutionary arguments to legitimate unequal attainments between social groups by insisting on their naturalness, durability, and inevitability. A particular example of such a propensity is the analysis of

the discrepancy of involvement in Science, Technology, Engineering and Mathematics (STEM) between men and women. This question has been strongly echoed in the past years in academia but also in the public sphere, for instance when James Damore – then a *Google* engineer – questioned the extent to which observed gender disparities in STEM were a product of workplace discrimination, and instead resorted to explanations derived from biology (Little and Winch, 2020). A typical evolutionary psychology approach on this topic is to put forward the fact that such disparities can be explained by gender differences at the level of preferences, aptitudes, and within-sex variability and "that these sex differences are not due solely or primarily to learning, socialization, or culture. Biology matters as well" (Stewart-Williams and Halsey, 2021: 4). Reacting to the *Google* controversy, evolutionary psychologist Geoffrey Miller would write for *Quillette* that Damore's memo "is consistent with the scientific state of the art on sex differences," adding: "[b]lank slate gender feminism is advocacy rather than science" (Miller, *in* Quillette Magazine, 2017).

Evolutionary psychologists emphasize that men and women differ in their choice of career and vocational preferences, and that they also exhibit variable aptitudes when it comes to abstraction and other cognitive skills. A dichotomy that is widely used in social psychological research to describe occupational interests is the *people vs things* divide: the *people* category encompasses living entities, feelings, nursing, sociality etc., while the *things* category encompasses technical and symbolic manipulation, machines, abstract rules, and so on (Lippa, 1998; Su and Rounds, 2015). According to this stream of research, men are tilting towards career and occupations involving the *things* side of the continuum, while women are concentrated on the opposite *people* side. This would partly explain why women favour "people related" curricula such as psychology, social science, and health, over "things related" ones, including STEM. Although the scientific relevance of the people-things dichotomy remains disputed (Thelwall et al., 2019; Yang and Barth, 2015), it is now well established that there are gender differences in disciplinary and scientific interests (England and Li, 2006; Key and Sumner, 2019; Nielsen and Börjeson, 2019). The question, then, is to know why.

Here, evolutionary psychologists diverge from social scientific explanations in two important ways. First, they hypothesize that such statistical divide between the two groups is rooted in evolutionary history of the human species: women would have evolved a stronger attentiveness to the needs of the young, and to people in general, because of their reproductive and nursing role. Drawing parallels between animals and humans, Marta Iglesias' (2017) article on feminism and evolution is thus illustrated with the picture of a "[f]emale baboon nursing her offspring." This evolutionary past would not only have repercussions on occupational preferences, but also on gender roles, so that women may often choose parenting over their career, because investing into the offspring would follow an inconscient evolutionary rationale. Second, evolutionary psychologists tend to disregard the fact that gendered preferences are attached to social hierarchies (be they symbolic, economic, or cultural), which inevitably leads to the "devaluation of 'female' activities" (England, 2010: 151). In contrast to this constant finding, some *Quillette* authors argue that male activities tend to be "more unpleasant, dangerous and demanding" (Brown, 2019).

Hence, although evolutionary psychologists do not completely deny that social factors hinder women involvement in STEM, they practically mitigate their influence in favour of an evolutionary storytelling. This is particularly noticeable in a *Quillette* article by David C. Geary, professor of psychology at the University of Missouri, and promoter of the *gender-equality paradox* (Stoet and Geary, 2018), which contends that in "more gender egalitarian countries", there are more discrepancies between men and women within curriculum achievements and involvement in STEM careers, compared to "less gender egalitarian countries" (Stoet and Geary, 2018). Although the existence of this paradox remains disputed (Richardson et al., 2020; Stoet and Geary, 2020), Geary argues in his *Quillette* piece entitled *Sex Differences in Occupational Attainment are Here to Stay* (Geary, 2020) that men have a particular incentive for striving to achieve professionally. Indeed, a well-known hypothesis in evolu-

tionary psychology is that social status and some degree of accomplishment in culturally important domains correlates with reproductive success in males (because of greater resource control, better protection, etc.). It logically follows that getting involved in high-demanding fields such as STEM would provide social recognition for men, so that their presence in such fields would be the manifestation, in our current modern world, of an inherited evolutionary strategy. The result is that unequal academic achievements between men and women are rendered normal, legitimate and, finally, inevitable:

> In any case, these broad patterns and the sex difference in occupational attainment persist, despite much money and time devoted to eliminating them. From an evolutionary perspective, the sex differences in work-life trade-offs and in career outcomes follow seamlessly from the historical pressures on men to achieve some level of cultural success, as well as women's greater investment in children. As long as men and women have some control over their work-life choices, reams of policy edicts, labor laws, and other forms of social engineering will not change the sex differences described by Hakim and many others (Geary, 2020).

The narrative behind the explanation of the discrepancies between men's and women's involvement in STEM thus goes down to invoking gendered behavioural traits that were allegedly selected during the Pleistocene epoch. Evolutionary psychologists contend that men's and women's career choices are often – and predominantly – influenced by unconscious evolutionary strategies. Still, they might "still be happy with their lives", with the consequence that "policies that artificially engineer gender parity – financial incentives and quotas, for instance – could potentially lower aggregate happiness" (Stewart-Williams and Halsey, 2021: 24).

Discussion and conclusion

In this paper, we tried to shed light on the uses of evolutionary psychology in the online magazine *Quillette*, a visible outlet that purports to offer "a platform for free thought". Our analyses focused on two interrelated aspects: a) how evolutionary psychology is both the object and subject of a boundary-work aimed at criticizing traditional social science by presenting this field as ideologically driven and unduly condemning of biological understandings of human behaviour; b) how evolutionary psychology is instrumentalized to normalize and sometimes legitimate unequal professional attainments between men and women, thus transmuting "inequalities" into "differences".

Our findings show that the critique of social science on the one hand, and the promotion of naturalistic views on gender inequalities on the other, cannot be fully separated. Since the 1990s, evolutionary psychologists have tried to depict social scientific research as ideologically driven and unscientific, in what can certainly be regarded as a classic case of boundary-work (Cassidy, 2006). Yet, they also do more than just competing for scientific recognition. *Quillette* articles are part of a larger effort to promote naturalistic ideas about human behaviour in the public sphere, with gender as a prime target. As we tried to show, one significant consequence of the uses of evolutionary psychology by *Quillette* authors is to offer a justificatory matrix for observed inequalities between dominant and dominated social groups. A specific 'sociodicy' ensues from this stance, with evolutionary psychologists interrogating "the causes of, and rationales for, social injustices and privileges" (Bourdieu, 1971: 312; see also Atkinson, 2021: 992). Whilst some of them insist that "a *description* of human nature is not a *prescription* for modern-day behaviour" (Flock, 2018), we also saw that it is not uncommon for evolutionary writers to transform an "is" into an "ought". This symbolic legitimization that purports to rely on science comes as a handy complement to higher social classes' justificatory narratives of their own success and others' failures (Khan, 2011; Littler, 2017). Usually, dominant groups "underscore their talent, vision or work ethic, and deny or downplay social advantages – in a nutshell, they ascribe their position largely to *merit*, which necessarily means defining those in lower positions as having *less merit*" (Atkinson, 2021: 992; see also Rivera, 2015). One important corollary of this meritocratic perspective is that "the aristocratic marks of class, exclusion, and inheritance have been rejected" (Khan, 2011: 196).

This is where the analysis of evolutionary psychologists' sociodicy is particularly noteworthy. While subscribing to the broad principles of meritocracy, for instance through their attachment to "equality of opportunities" (Stewart-Williams and Halsey, 2021: 15), *Quillette* contributors also adhere to a strict categorization of the sexes that is correlated, according to them, to population difference in interests and variability in cognitive *abilities*. Thus, it becomes perfectly normal that equality of opportunities does not necessarily "translate into equality of outcomes" (Stewart-Williams and Halsey, 2021: 15; see also Quillette Magazine, 2017), a distinction that is reminiscent of sociologist and conservative-leaning thinker Daniel Bell (Littler, 2017: 87).

The meritocratic framework is thus somewhat nuanced through the introduction of a group-level variable that is independent and separable from the institutional arrangements of the educational system (among other institutions of legitimacy), leading to a peculiar form of biological aristocracy that functions as a gendered marker of social worth. The 'intergenerational self' of privileged people (Friedman et al., 2021) partly becomes biological. This is how evolutionary psychologists transform inequalities into differences: by "making differences in outcomes appear a product of who people are rather than a product of the conditions of their making" (Khan, 2011: 9), *Quillette* authors contribute to the elaboration and diffusion of a naturalized meritocratic narrative rooted in an inescapable evolutionary past.

We know that references to biological knowledge have become important for expressing social revendications and alimenting ongoing political debates, both on progressive and conservative sides (Grossi, 2020; Panofsky and Donovan, 2019). Normative views about the social world are presented as stemming from science, which favours their public diffusion even though they are sometimes not completely consensual within the scientific field. The proximity between evolutionary writings in *Quillette* and conservative ideas is particularly noteworthy because public representatives of evolutionary psychology used to "distance [themselves] from conservative politics" (Cassidy, 2006: 196), in particular through association with leftist political groups both from the US and the UK in the 1990s.

To be sure, this does not mean that evolutionary psychologists suddenly shifted from the left to the right of the political spectrum. In fact, existing surveys would tend to show that graduate students in evolutionary psychology and anthropology hold typical liberal views and are in this regard no different than their peers who are attached to a different theoretical framework (Lyle and Smith, 2012; Tybur et al., 2007). What it does demonstrate, however, is that scientific theories relying on a biological foundation are politically flexible and amenable to varied ideological shaping (Meloni, 2016). In this regard, *Quillette* participates in blurring the distinction between evolutionary theory as a heterogeneous scientific field, and evolutionary theory as a cultural product that can also be used as a means of developing, promoting, and legitimizing political views (Jackson and Rees, 2007). By publishing academically fashioned contributions written by evolutionary psychologists, it contributes to amalgamate the latter with the former.

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Notes

1 The research was done on June 8th, 2021.

2 https://quillette.com/about/ (accessed 21 August 2021).

3 These numbers were obtained with the help of *Wayback Machine*. Please note that the *Quillette Twitter* username changed in January 2019, from *@QuilletteM* to *@Quillette* (previously taken).

4 Darwin Day is an international day of celebration held annually on February 12th, which coincides with Charles Darwin's birthday in 1809. It is meant to pay tribute to the life and discoveries of Charles Darwin and, more generally, to promote science and scientific reasoning in society.

5 The word 'sociodicy' was coined by Bourdieu (1971) to describe the narratives and argumentative strategies developed by the dominant classes to justify their advantageous positions within the social world.

Calvert Jane (2024) A Place for Science and Technology Studies: Observation, Intervention and Collaboration. Cambridge: MIT Press. 232 pages. ISBN 9780262546942

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For the past 15+ years, Jane Calvert has been a central figure in STS' investigations in the area of synthetic biology (SynBio). The work in the area has been both extensive and wide-ranging, from policy and governance recommendations and reports on appropriate use, to considerations at the intersection of synthetic biology and art, and much more both adjacent and in between. In the face of this substantial scholarship, *ceci n'est pas un livre sur le sujet de la biologie synthétique*. I mean, it is and it isn't. What Calvert presents is a reflection – not a report – on years of STS scholarship in this area, and – more central to the book – the diverse orientations that work has taken. In the process of doing so Calvert does not re-present the findings from previously published work, but instead describes and critically reflects on their role as an STS scholar in diverse settings, "on the nature of the field, its origins, and its objectives" (p. 10). The result is a critical and self-reflexive examination of the author's research program that has covered a range of activities, as well as an exploration of orientations the interdisciplinary field of STS can, and does, undertake.

To help in this reflection Calvert develops a metaphor of 'rooms' to describe the different contexts that an STS scholar finds themselves in. The rooms are not specific physical spaces, but rather representations of diverse research and practice settings where Calvert has conducted a range of activities with varied colleagues and collaborators through the years. A chapter is dedicated to each of these rooms: the laboratory, the conference room, the classroom, the coffee room, the art studio, the bioethics building, the policy room, and the ivory tower. The description of the rooms is not limited to the kinds of insights of the socio-technical work whereby SynBio gets done in diverse settings but also includes Calvert's own experience in conducting STS research on-and-with the diverse SynBio communities. In doing so, Calvert traces how STS more broadly has conducted its academic business in such settings. Eschewing 'academic' and 'activist' forms of STS, Calvert instead focuses on the three different orientations of observation, intervention, and collaboration, and then moves "from room to room in the following chapters" enabling her "to explore the various situations that allow for each of these orientations, the opportunities they provide, and the challenges they present" (p. 12). Near the end of each chapter, Calvert inquires into the extent to which that particular room is 'a place for STS', and explores how STS is constrained or enabled there depending on the kind of orientation that the room facilitates.

For instance, in an early chapter on the laboratory, Calvert sketches out lab studies within STS and traces how its primarily observational practices have evolved. The author goes on to describe their work within a synthetic yeast project and one of its associate labs where they were located. With a description of the author's activities within the lab in place, a lament follows of the observational role that can be left to STS scholars in this context. Calvert notes that if a project has

been set in motion with little STS input, or there is no congruence between the expectations of the scientists and the STS researcher of the work to be done, then there is really no chance for meaningful intervention or collaboration within the project. Calvert then notes that this kind of observational orientation for STS within the lab is rather limited, and points towards the benefits of different kinds of ethnographic practices in contemporary STS research.

Calvert follows this approach as they travel from room to room in subsequent chapters that make up the core of the book. The conference room is seen to be designed to be observational with opportunities for pointed intervention, whereas the ivory tower (i.e., academia and the library specifically) is seen as a place for a type of retrospective observation through writing and reading. The policy room can be seen as a place to observe the policy process, but also as a place to build policy set to steer or intervene in SynBio activities (p. 175). Calvert highly values the art studio and the coffee room as collaborative spaces "that are not motivated by instrumental aims or tied to predefined deliverables but instead involve thinking with others" in an experimental mode that can "expand the imaginations of those involved and give rise to outcomes that are novel and unexpected" (p. 175). This form of collaborative STS is advanced in the concluding chapter where Calvert advocates for opportunities where researchers are integrated into the production of science and technology, but in a way that preserves our ability and space to make critical contributions to that knowledge- and material-making.

Throughout the book, techno-scientific utopian or dystopian positionality is rejected, and instead, forms of 'otherwising' (i.e., the idea that things could be otherwise) are advocated for in problematizing particular futures, assumptions of innovations, or techno-scientific trends. Calvert's experiences demonstrate the value of individual researchers spending time in different spaces/rooms, and in doing so exploring the three orientations of observation, intervention and collaboration in STS. In part this is beneficial, according to Calvert, "to calibrate our policy work" (p. 158), but more so because it can be of epistemic assistance to "recognize value and limitations of each [orientation], the necessity of shifting between them in some circumstances, and the tensions that can result from doing so" (p. 174).

In many ways, there are not a lot of books like this. In fact, I cannot think of one that engages with the orientations of the discipline (that is not in the manner of a textbook) but also tells a first-person research-driven account of the different things STS can be. Perhaps one of the reasons for this rarity is the difficulty of striking a balance between meta-analysis of STS as a discipline, and auto-biographical reflection of a researcher's position within it. In this instance thick descriptions of the author's activities within the rooms do make up the bulk of the book (save the introductory and concluding chapters), but make no mistake, Calvert's work in SynBio is a vehicle to explore broader issues within STS and the role of researchers there. The connections that Calvert is reflecting on between academic and activist positioning of STS to science and technology is one that is widespread in the field. The reorientation towards observation, intervention, and collaboration is both apt and likely to address this tension that has been present in STS since the normative, and then interventionist turns. In this way, the book stands to be of particular interest to those starting off on STS journeys, as well as those reflecting on and situating their own practices (be them in academia or elsewhere). Many – including Calvert – see STS as a field of scholarship that has a kind of disciplinary insecurity compared to more traditional approaches that are institutionalized with dedicated departments and funding programs that bear their names. STS researchers are "itinerant", says Calvert, lacking "a room of their own; instead, they move from room to room. In this way, they become a liminal figure" (p. 173). Because of this liminality, STS needs books like this. We need to reflect on not just what we want STS to be but also broaden our horizons of what it can be. We need to explore what kinds of rooms we can do our work in, and the strengths and limitations our approaches and contributions are likely to face in those spaces. This book helps us to think about the orientations through which we practice STS, what those practices need in terms of resources and support, where we embody these different orientations, and to what end or purpose.

Matzner Tobias (2023) Algorithms: Technology, Culture, Politics. London, New York: Routledge. 202 pages. ISBN 978-1032290591.

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Tobias Matzner's recent book *Algorithms: Technology, Culture, Politics* starts with an often-recited dictum: "Algorithms are not neutral!" (p. 1) This widely accepted notion that algorithms embody biases with political implications reflects the outcome of extensive research and scholarship on algorithms. It is, however, not the conclusion that Matzner, professor of Digital Cultures at Paderborn University, seeks to draw. Instead, Matzner's relational reframing of algorithms takes the principle of non-neutrality as the starting point for a well-developed analysis of algorithms as a research perspective. In doing so, the book positions itself amidst a growing field of critical literature on algorithms.

Building on this premise, Matzner considers algorithms as "a research perspective that provides a link between the abstract and the concrete" (p. 6). Matzner critiques the current approaches in studies of algorithms, which often either abstract algorithms into broad analytical categories or reduce them to one or many components. He illustrates the former with concepts like 'algorithmic governmentality' (Rouvroy, 2013) or 'algorithmic culture' (Striphas, 2015), where algorithms are so generalized that their technical aspects are overlooked. In contrast to these abstract understandings of algorithms, other scholarship demands to "break [the algorithmic] ecology down into components and unravel its technical underpinnings" (Munn, 2018: 23), thereby neglecting broader social and cultural implications. Similarly, Seaver (2018: 378) dissolves algorithms into the human decisions underlying them, claiming that one can "press on any algorithmic decision and […] will find many human ones". While these perspectives are important for our thinking about algorithms, for Matzner they only consider algorithms as the "occasion of analysis" (p. 5). What Matzner aims at instead, is to describe a co-constitutive relation between the concrete and the abstract, such as the relation between "an academic essay originality score" and "the neoliberal university" (p. 36). Instead of abstracting or dissolving algorithms, what is sought is a perspective that, as Matzner puts it elsewhere, "resolves this tension by conceiving of algorithms as a relation between the abstract and the concrete that allows to capture both in their interdependence" (Matzner, 2024: 1799). Algorithms are abstractions that need to be complemented by concrete elements, such as hardware, networks, program code, and users. These elements do not, however, determine or constitute the algorithm; the concrete and the abstract co-constitute each other.

To unpack the above thesis, the book is divided into two parts, comprising three and six chapters, in which Matzner develops his argument with historical, theoretical, and empirical rigor. Part I establishes the theoretical framework, beginning with a historical perspective on the foundations of mathematics and the limits of computation,

punch cards and mechanical data processing, and cybernetics, demonstrating that algorithms have always been relational. An illustrative example is punch cards, which could be sorted by machines known as unit recording equipment (p. 23). While functions like sorting or counting are algorithms, a relational perspective illuminates the relationship of the abstract phenomenon of efficiency in administration and accounting to the concrete form of machinery.

The core of Matzner's theoretical thinking develops in a close reading of Karen Barad, interpreted alongside the works of Foucault, Haraway, and Butler. Central to this is Matzner's concept of 'radical situatedness', highlighting that algorithms do not have a single, fixed definition but that they change based on their context and the elements they interact with. As Matzner explains, algorithms "relate to particular, concrete elements that constitute them", yet these elements "are not external to algorithms; they are also changed by algorithms in a co-constitutive relation" (p. 50). While algorithms abstract from their material conditions, they are at the same time complemented by them. Depending on whether the focus is on energy, hardware, datasets, or programming languages, the situatedness and abstraction of an algorithm changes. In each complementary relation, algorithms become something different, a notion akin to Barad's (2007) idea of 'cuts'. Algorithms are a research perspective, making certain aspects visible, while others get out of view, depending on the situation that is being analyzed.

This lays the ground for Part II of the book, in which five chapters explore different forms of situatedness and the final chapter presents a conclusion. The style in which Matzner presents and exemplifies his thesis becomes even more crucial in this second part of the book: trained both as a philosopher and a computer scientist, Matzner is able to provide a perspective thoroughly grounded in empirical observation and theoretical detail. In these chapters, Matzner discusses algorithms in relation to material conditions, code, data, subjects, and humans, illustrating his argument with examples ranging from high-frequency trading and plagiarism detection software to text messaging apps and the more recent development of generative AI chatbots. These examples not only illustrate the arguments effectively but are compelling case studies in their own right.

Matzner's book provides a substantial contribution to recent literature on algorithms, providing an analytical framework that helps study algorithms in their situated abstractions. Generative AI chatbots, which are, due to the book's publication timeline, only mentioned briefly towards the end of the book, provide an interesting point here. Often designed as multi-purpose systems, their relationality and situatedness become particularly evident through their use and deployment in different contexts. For instance, a chatbot like ChatGPT can function as a writing tool for scientists, an assistant in customer service, or a subject of public debate on automation and displacement. Matzner's relational perspective highlights how these functions are not inherent to the chatbot itself but emerge through its interplay with data, users, and technical infrastructure, revealing broader abstractions such as the automation of intellectual labor. This perspective provides a framework to study not only what algorithms do, but also what they disclose.

The book is not an easy read, but it is all the more rewarding. It will be of interest to scholars in fields of science and technology studies, philosophy, cultural studies, and political theory, interested in developing a critical and theoretically grounded perspective on algorithms. It will also appeal to computer scientists interested in engaging with social science and humanities perspectives.

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