A Pluralistic Approach to Interactional Expertise

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ABSTRACT

The concept of interactional expertise – characterized by sociologists Harry Collins and Robert Evans as the ability to speak the language of a discipline without the corresponding ability to practice – can serve as a powerful way of breaking down expert/non-expert dichotomies and providing a role for new voices in specialist communities. However, in spite of the vast uptake of this concept and its potential to fruitfully address many important issues related to scientific expertise, there has been surprisingly little critical analysis of it. We seek to remedy this situation by considering potential benefits of interactional expertise and the ways in which the current conception can – and cannot – realize those benefits. In particular, we argue that interactional expertise hasn't reached its full potential for addressing who ought to be involved in scientific research and decision-making, largely owing to an unnecessarily restrictive way of operationalizing the concept. In its place, we offer a broader, more pluralistic account of interactional expertise – one that is in line with the original spirit of the concept, but also captures the diversity that we see as being an important aspect of interactional experts and the value they can bring to the table.

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1. Introduction

Scientists are faced with increasingly complex problems—such as climate change, poverty, and global epidemics—that require diverse sets of expertise from a variety of sources. Successfully addressing such problems often requires collaboration across disciplines and communities, involving local and specialist knowledge from those who may not conform to conventional notions of expertise. In order to address these challenges, it is crucial to have ways of identifying and legitimizing non-traditional forms of knowledge and expertise. Unfortunately, however, those with relevant expertise are often excluded from scientific research and decision-making processes. While in some cases non-traditional experts are willfully excluded or ignored, in other cases they are overlooked simply because of the difficulty in identifying, legitimizing, and involving expertise that isn't marked by the traditional education, training, or accreditation of the scientists involved. Fortunately, some sociologists and philosophers of science have identified these problems and begun to suggest ways in which we might address them.[1]

One of the more promising approaches to recognizing non-traditional forms of expertise is associated with a new research area called "Studies of Expertise and Experience" (SEE), developed by sociologists Harry Collins and Robert Evans. As part of this research program, Collins and Evans have introduced a new concept called 'interactional expertise' (IE), which captures the ability to speak the language of a discipline or area of specialist

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[1] See, for example, Wynne (1989); Epstein (1995); Collins and Evans (2007); Whyte and Crease (2010).

knowledge in the absence of a corresponding ability to practice its tangible skills in the lab (2002, 2007).[2] This concept has received a substantial amount of attention in both theoretical and applied case studies, and has been leveraged to begin to recognize instances of scientifically relevant knowledge held by those who are not traditional experts in the field. While IE provides a powerful and valuable way of articulating an often overlooked type of expertise, we argue that (1) some of the ways in which it has been presented by Collins and Evans has led to it being construed in an unnecessarily restrictive fashion, and that (2) the concept can be broadened to capture the vast diversity of experience and expertise needed to address complex social problems. Furthermore, we argue that this broader notion of IE remains true to the original spirit of Collins and Evans' work.

To understand the definition of and vision behind IE requires revisiting initial work on the topic. When Collins and Evans first introduced the concept of interactional expertise in a 2002 paper entitled "The Third Wave of Science Studies: Studies of Expertise and Experience," the concept was quite broad, focusing on developing ideal categories for various types of experts. Using the example of sociologists of scientific knowledge as interactional experts, they defined an interactional expert as one who has "enough expertise to *interact interestingly* with participants and carry out a sociological analysis" (p. 254, emphasis added). They contrast this with what they call 'contributory expertise'—what we normally think of as traditional expertise—which they define as having "enough expertise to contribute to the science of the field being analyzed" (Collins & Evans, 2002). Later in the paper, they discuss the importance of interactional experts being able to speak the *language* of a discipline—in subsequent publications, this linguistic ability has become the centerpiece of their characterization of IE.[3]

As they developed the concept further, Collins and Evans also worked to operationalize it—to demonstrate what it would take for someone to "count" as an IE (Collins, 2004; Collins & Evans, 2007). They argued that since IEs had the ability to speak the language of a discipline—a skill obtained through immersion in the expert community—IEs should be able to "pass" as contributory experts; in other words, they should be indistinguishable from other CEs, even by CEs themselves, in conversation. Collins and Evans couched this in terms of passing a Turing-like test (which they later refer to as the 'imitation game'), in which an expert serving as a judge would pose questions to a contributory expert and an interactional expert, where their identities are hidden, and receive answers from each of them. If the interactional expert were able to avoid being detected as a non-expert, they would be said to have 'passed' as a full-fledged IE. Since introducing the imitation game as a way of operationalizing IE, most of Collins and Evans' subsequent work has continued to take this as a central indicator of whether IE has truly been obtained.

While there are merits to this way of operationalizing IE (including providing a way to explore the linguistic and tacit components of expertise, as well as a practical tool for assessing the presence of IE), we argue that this conception of IE is too narrow and risks excluding those who would fit the spirit of the concept (i.e., the ideal types as set out in Collins & Evans, 2002) but perhaps fail to pass a real-life imitation game. Although it's possible to take the imitation game as merely a heuristic not intended to be used in practice, we argue that a more descriptively adequate, pluralistic,

and interesting account of IE can be developed by ensuring that the imitation game doesn't become a singular normative or defining feature of IE. Thus, we call for a more flexible conception of IE, one that can capture the heterogeneous instantiations of the concept and is better able to recognize a diversity of expertise. As we argue, including a more diverse set of expertise can lead to better scientific knowledge, as well as more democratic technical decision-making.

In this paper, we develop a pluralistic account of interactional expertise that is both in line with the original spirit of the concept and that attends to the diverse types of IEs that we think exist. We begin, in Section 2, by offering a more detailed account of the concept of IE and the ways in which it has been developed. Next, in Section 3, we identify what we take to be potential benefits of the concept of IE, which include identifying and legitimizing nontraditional experts; improving the uptake and application of scientific research by stakeholder communities; and improving the quality of scientific work by including new perspectives and social locations in knowledge production. In Section 4, we go on to identify the reasons that the current conception limits the realization of these benefits, emphasizing the role of the imitation game in limiting the types of potential IEs that might be recognized, restricting the potential roles that IEs might have, and encouraging homogeneity within existing expert communities. Finally, in Section 5, we offer a pluralistic approach to IE, which we argue is not only more descriptively adequate, but can also provide more of the benefits identified in Section 3. In doing so, we emphasize the idea that the value of interactional experts lies in the unique perspectives they can bring to the table, rather than in their ability to sound like other contributory experts. In particular, we suggest that scholars and users of IE should (1) make use of the original, more holistic definition of IE as 'interacting interestingly' with contributory experts, (2) be aware of the diverse profiles of interactional experts, (3) acknowledge that IEs can make substantive and direct contributions to the field in which they hold interactional expertise, (4) view issues of inclusion and diversity as epistemically relevant to science, and (5) embrace and leverage this diversity among interactional experts.

We wish to make it clear that our intention is not to suggest that the concept of interactional expertise is epistemically bankrupt or thoroughly problematic, but rather to highlight some of the problems with the way it's been developed and offer some ideas as to how it might be fruitfully broadened. We believe that a more pluralistic account will serve both epistemic and democratic goals by capturing the diversity of types of interactional experts whose knowledge and experience can improve scientific knowledge and technical decision-making. Finally, we think a pluralistic approach will open up exciting new territory for this concept, both theoretically and in practice.

2. The concept of interactional expertise

Interactional expertise is most commonly characterized in terms of linguistic ability.[4] According to Collins and Evans (2007), IE is "expertise in the *language* of a specialism in the absence of expertise in its *practice*" (p. 28). Collins and Evans contrast IE with more traditional forms of expertise—which they dub 'contributory expertise' (CE)—for which individuals have undergone formal education and training in their field of expertise and often possess credentials that legitimize their epistemic authority. This contrast can sometimes occur by presenting interactional expertise as a

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[2] Throughout this paper, we abbreviate 'interactional expertise' as IE and 'interactional experts' as IEs.

[3] For a detailed account of the evolution and uptake of the concept of interactional expertise, see Kennedy and Plaisance, ms in preparation.

[4] See Kennedy and Plaisance, ms in preparation for a more detailed analysis of the other ways IE has been characterized, including passing the imitation game, which we critique in Section 4.

deficit, whereby IEs are on par with CEs in terms of the mastery of disciplinary language but *lack* the ability to practice any of the skills central to that discipline. According to Collins and Evans, "[T]he analyst is not going to be given a job or let loose in a scientific laboratory […] The analyst who has even the highest levels of interactional expertise may be able to *understand* scientific things, and to *discuss* scientific things, but is still not able to *do* scientific things" (p. 35).

One of the most important aspects of interactional expertise concerns the way in which it is acquired. To become an IE, one must immerse themselves in the expert culture, rather than just reading textbooks and journal articles. The reason for this is that "the language of a domain, like any spoken language, consists of more than propositional knowledge" (Collins & Evans, 2007, p. 29), including tacit knowledge and nuance about unstated concepts, assumptions, and paradigms. Thus, individuals who wish to acquire interactional expertise must actually "hang out" with a community of contributory experts to be fully immersed in their 'way of life'. In doing so, potential interactional experts go through various stages as they acquire linguistic fluency, beginning with interview-style questions and proceeding through discussion to fluid conversation.[5] According to Collins and Evans, the interactional expert will eventually reach a stage where the contributory experts "will start to be happy to talk about the practice of their science and even give studied consideration to critical comments. Eventually [contributory experts] will become interested in what the [interactional expert] knows about the field because he or she will be able to convey the scientific thoughts and activities of others in a useful way" (2007, p. 33). Despite these potentially interesting interactions, however, Collins and Evans hold that interactional experts will typically not be able to make contributions to the field in which they hold interactional expertise.[6]

It is important to note that Collins and Evans originally developed the concept of interactional expertise based on their own experiences as sociologists of science. In order to conduct their work, sociologists of science have to learn a significant amount of the content and culture of the scientific discipline that they're studying. However, as Collins and Evans point out, they rarely learn enough to actually *practice* the science—while they may be able to converse with contributory experts about their work, sociologists are typically unable to carry out sophisticated experiments on their own. Collins, for example, spent several years engaging with gravitational wave physicists in order to undertake a sociological analysis of the field. He found that, despite an inability to contribute new knowledge to the field, he was able to talk like a gravitational wave physicist and have interesting and fruitful conversations with them—interesting not only for his own work, but for theirs as well. Thus, Collins and Evans argue, interactional experts may inspire CEs to come up with new ideas, thus making *indirect* contributions via traditional experts.

These experiences led Collins and Evans to propose their "strong interactional hypothesis", which states that "the level of fluency in a domain that can be attained by someone who is only an interactional expert is indistinguishable from that which can be attained by a full-blown contributory expert" (2007, p. 31). In other words, they suggest that an interactional expert would be able to "pass" as a contributory expert in conversation with other contributory experts. In doing so, Collins and Evans operationalized IE in terms of passing a Turing-like test—an imitation game—through which IEs

would be able to fool a judge (who holds contributory expertise in that domain) into thinking they are a full-blown CE. Since the introduction of the imitation game in Collins (2004), a significant amount of Collins and Evans' work has focused on running the imitation game with various social groups (largely privileged versus marginalized groups of people, such as Caucasians and ethnic minorities in the UK). As we discuss in Section 4, the increasing focus on the imitation game has moved Collins and Evans away from defining IE and CE in terms of ideal types (2002) to emphasizing the *indicator* of IE in terms of successfully playing/ passing the imitation game.

Since introducing the imitation game as the marker of IE, Collins himself has reflected on the concept of IE and the major differences between IEs and CEs. In his (2011) paper, "Language and Practice," Collins notes that contributory experts themselves are typically interactional experts in their own field as well, and thus the category might be much larger than he originally anticipated. In response to this, he introduces the term 'special interactional experts' to capture those who fit the notion of an IE but are not also contributory experts in the field. Collins then goes on to suggest that the main difference between CEs and IEs is not just their ability or inability to practice and contribute new knowledge to that discipline, but the way they *acquire* their expertise. While contributory experts receive formal education and training through years of graduate study and laboratory or fieldwork, special interactional experts learn the language of a discipline through *informal* immersion with a community of contributory experts. While we think it's useful to examine the sociological differences between IEs and CEs, rather than just epistemological ones, it remains the case that Collins and Evans continue to emphasize the imitation game as a marker of IE. Furthermore, this more recent work does not address the importance of diversity, which we see as being key to harnessing the potential benefits of IE, as we discuss below.

In spite of what we see as some problematic developments of the concept of IE (in particular, the continued emphasis on passing the imitation game as the mark of IE), it remains a powerful concept on the whole. In the next section, we discuss the potential benefits of interactional expertise, emphasizing the ability of the concept to identify and legitimize relevant knowledge held by non-traditional experts, which, we suggest, can have a variety of positive effects on the creation and uptake of scientific knowledge. After laying out some of these benefits, we go on to discuss the limitations of the current conceptions of IE and suggest ways that broadening the concept (in a way that's more in line with the ideal type presented in Collins & Evans' 2002 paper) might better realize these benefits.

3. Potential benefits of the concept of interactional expertise

There is a great deal of potential value in the concept of interactional expertise. Not only does it provide a useful way of capturing a type of expertise that often goes unnoticed (i.e., it's descriptively fruitful), but it also has normative implications in terms of who ought to be included in scientific and technical decision-making. In what follows, we illustrate how interactional expertise can help address a variety of important issues in the social studies of science. These include: (1) who ought to be included as an expert in scientific knowledge production and technical decision-making, (2) how those with relevant expertise might be identified, (3) how we can legitimize these experts, once they've been identified, so that their ideas are given uptake, (4) the ways in which including non-traditional experts can increase the buy-in and trust of scientific findings amongst broader communities, and (5) the role that increasing the diversity of experts plays in improving the quality of scientific knowledge and decision-making. Below we discuss each of these five points in turn, illustrating how

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[5] While they don't say exactly how long it takes to acquire IE, Collins (2004) suggests that "Developing interactional expertise is the job of months or years of interaction" (p. 129).

[6] We later argue against this claim (see Section 5).

the concept of interactional expertise can help to fruitfully address these issues and bring a variety of benefits to the creation and application of scientific knowledge. Next, we explore why these benefits have not been fully realized on the current conception of IE (in particular, due to the way that IE is operationalized in terms of passing the imitation game) and how a more pluralistic approach to IE can remedy this situation.

One of the principle motivations behind developing a more thorough sociological account of interactional expertise was to address a major theme in the sociology of science, namely just who ought to be included in knowledge production, validation, and implementation processes. In motivating their initial work on the subject, Collins and Evans note that science studies "has failed to solve the Problem of Extension: 'how far should participation in technical decision-making extend?'" (2002, p. 237). Interactional expertise explicitly speaks to this challenge by suggesting that we ought to be able to at least involve those who can speak the specialist language at a fluent and productive level, despite the fact that they might come from non-traditional backgrounds, disciplinarily or otherwise. This can be seen in the case studies that Collins and Evans draw on in their early work (e.g., Epstein's AIDS activists and Wynne's sheep farmers), as IE is explicitly used to capture and include seminal cases of expertise in the science studies literature.[7] In fact, the concept of IE addresses this question with an important level of nuance. By identifying additional types of expertise as part of the larger "periodic table of expertise" (ranging from knowledge of trivia to the highest forms of specialist practice), IE helps us move away from problematic expert/non-expert dichotomies.[8]

A related, though subtly different, benefit of interactional expertise can be found in its ability to ensure that potential IEs are identified in the first place. It is often difficult to identify things for which one does not have a concept. Thus, non-traditional experts may be overlooked simply due to the lack of cognitive tools for identifying, articulating, or noticing them. Whyte and Crease (2010) label these "Unrecognized Contributor" cases, where groups or individuals with scientifically relevant knowledge are ignored or dismissed because they lack the formal education or credentials by which scientists, or contributory experts more generally, might have realized that they had specialist knowledge to contribute.[9] Interactional expertise can help address this problem in two ways: first, by providing the conceptual framework through which traditional experts can identify individuals and groups that hold relevant knowledge and thus ought to be included, and second, by identifying IEs who can serve as mediators between scientific communities and important stakeholders.

Identifying these new kinds of experts, however, is only part of the challenge. A complementary problem is that of legitimacy, namely the idea that "technical decision-making can and should be widened beyond the core of certified experts" (Collins & Evans, 2002, p. 237). Once new voices have been identified as potential IEs, they still must be legitimized in technical and specialist processes so that they can have ongoing participation and representation. The concept of interactional expertise can help with this by providing a label that acknowledges the work that IEs have done to

establish linguistic fluency in a specialism and the resulting ability to interact in productive ways with contributory experts.

In addition to improving scientific knowledge and decision-making, recognizing and legitimizing non-traditional experts can also increase the *uptake* of such knowledge among these previously excluded communities, for example by cultivating trust between scientists and the communities who are in a position to make use of their research. Whyte and Crease (2010) illustrate this through the sheep farmer case (Wynne, 1989), demonstrating that the scientists' failure to recognize the local knowledge of the farmers not only led to a missed opportunity to improve their models and obtain more accurate calculations, but also led to the farmers' distrust of the scientists. Naomi Scheman (2001) and Heidi Grasswick (2010) identify this loss of trust as a serious problem for science since, as they argue, the uptake of scientific knowledge is a constitutive goal of science, and thus a failure of uptake is a failure on the part of science. Interactional expertise can help to prevent such epistemic failures by providing the means to identify and meaningfully involve new groups in scientific and decision-making processes. This may also reduce the active exclusion of already marginalized groups from these conversations, thereby improving the effectiveness and impact of the work being done.

The idea that bringing a diverse set of experts to the table can improve the practices and products of scientific research, as well as its effectiveness and uptake, has been demonstrated by feminist epistemologists for decades. To set the stage for illustrating the epistemic benefits of diversity, Lorraine Code (1981) proposed the idea of situated knowledge, which holds that individuals in different social locations (e.g., different genders, races, or social classes) have different perspectives that affect what they know and how they come to know it. Building on this idea, other researchers have highlighted an even wider variety of factors that tend to be epistemically relevant such as cognitive diversity (e.g., Page, 2008). This work has established a clear need for a various kinds of diversity in scientific and other knowledge-producing communities. In particular, Helen Longino has argued that diversity within a community actually makes scientific knowledge more objective (1990, 2002). She points out that different researchers will often have different background assumptions, owing to their different perspectives, which may enable them to identify problematic assumptions or offer a wider variety of alternative explanations. Thus, for Longino, a community can create more objective knowledge when it has structures in place to ensure that diverse perspectives are available and taken seriously. The concept of IE can be useful in this regard by helping to identify individuals and groups who can speak the language of a discipline and converse fluently with contributory experts, but who also hold different sets of assumptions and viewpoints with respect to the issue at hand.[10]

Collins and Evans themselves point out that IEs are in a good position to generate new epistemic insights, including the ability to identify and question basic assumptions, play the role of Devil's advocate, and ask new questions that lead to innovative answers. For example, Epstein's AIDS activists (Epstein, 1995) questioned assumptions normally taken for granted by medical researchers, including the belief that a drug's safety must be demonstrated before it would be morally justifiable to allow it to be prescribed. Rather, these activists argued, in the case of HIV-positive patients, there was no other effective treatment for what was a fatal diagnosis at the time, and thus the prescription of an experimental drug with significant negative side effects could be seen as less harmful than no treatment at all. This new perspective led to substantial

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[7] Epstein (1995) explores a case where AIDS activists learned the language of the medical establishment to successfully challenge drug-testing protocols. Wynne (1989) highlights the local knowledge of sheep farmers that was overlooked during a scientific investigation into the impact of radiation from Chernobyl on sheep populations in the UK.

[8] See Collins and Evans (2007) for more on the Periodic Table of Expertise, which includes IE and CE as the two types of specialist expertises.

[9] Examples and discussions of unrecognized contributors can also be found in Wynne (1989); Epstein (1995); Carolan (2006); Jenkins (2007).

[10] See Plaisance, manuscript in preparation (a) for a more detailed discussion of the role that interactional experts can play in increasing objectivity on Longino's account.

changes in the drug testing processes, which had benefits for both the patient groups and the scientists themselves.

Given our discussion above, it would seem that one of the primary values of interactional experts lies in the different perspectives they can bring to the table, such as their local knowledge (in the case of Wynne's sheep farmers), their ability to challenge long-held assumptions (as the AIDS activists were able to do with great success), and the very fact that they were not formally trained to accept the paradigm held by contributory experts. However, these diverse perspectives are only useful insofar as they are recognized and taken seriously. In the last section of the paper, we identify some important features of IEs that should be acknowledged if we wish to capitalize on these potential contributions. In doing so, we hope to offer a broader account of IE that is better able to aid normative accounts like Longino's. Next, however, we turn our attention to the current conception of IE, and in particular the way it is operationalized through the imitation game, to illustrate how it unnecessarily limits the realization of the epistemic and social benefits described above.

4. Problems with the current conception of interactional expertise

As we illustrated above, the concept of interactional expertise has many potential benefits, both in terms of providing a better understanding of the nature of expertise as well as offering useful prescriptions for whom to include in scientific research and technical decision-making. However, as we argue below, the realization of these benefits is limited by the way IE is currently conceptualized. In particular, we suggest the following: (1) the imitation game is overemphasized, and as a result, (2) IE is too narrowly defined; (3) focusing on the imitation game risks overlooking important—and likely already marginalized—groups of individuals with potentially relevant knowledge; (4) the current conception of IE focuses too strongly on the value of homogeneity and fails to recognize the importance of having a diversity of perspectives; and, finally, (5) the role of IEs is unnecessarily restricted. In what follows, we discuss each of these five problems in turn. In Section 5, we go on to suggest ways that each of these limitations can be addressed by taking a more pluralistic approach to IE.

One of the main issues we see with the current conception of interactional expertise is the central role that the imitation game has come to play in characterizing IE. Initially, the imitation game was presented as a hypothesis (the 'strong interactional hypothesis', the reader may recall), which held that interactional experts would be indistinguishable from contributory experts in conversation. In their (2006) paper, Collins et al. tested this hypothesis by asking gravitational wave physicists (GWPs) to pose technical questions about their field and to assess the answers in order to determine if someone was a GWP. In short, the experiment showed that Collins, who has immersed himself in a community of GWPs for several years, was able to pass as a GWP while Evans, who knows a lot about the subject but has not been immersed in an expert community, was not.

Certainly, this is an interesting and informative finding. However, we worry that there may be cases of those who would be considered an interactional expert in the sense of having an ability to speak the language of a specialism and an ability to interact interestingly with contributory experts (definitions of IE found in Collins & Evans, 2002), while unable to pass an imitation game for a variety of possible reasons. This issue raises the question: how do we identify potential IEs that we can test without introducing a tautology? Notably, Evans himself had not spent time learning the language of GWP from the contributory experts, so perhaps that's the reason for his inability to pass, suggesting that the means of

acquiring IE is an important factor to emphasize. A better test case might be the AIDS activists discussed in Epstein (1995), who are cited as a paradigmatic case of interactional expertise. These individuals had an ability to speak the language of a specialism, learned that language through immersion, and were able to 'interact interestingly' with contributory experts (so much so that they successfully changed some of the requirements for clinical trials on potential HIV treatments). However, it's not clear whether or not they would be able to pass an imitation game if given the chance. In the interactions they actually had with contributory experts, it's likely that they would *not* have passed, largely owing to the critical stance they took with respect to the medical establishment, but also possibly as a result of different ways they spoke (e.g., as a result of not having been formally educated and trained in an academic institution, as was the case with Collins).[11]

One of the issues that this example raises is that those who are potential IEs will sometimes—perhaps even quite frequently—be part of an already marginalized group with respect to the community of experts with whom they must immerse themselves (e.g., farmers dealing with the intrusion of outside scientists threatening their livelihood; patient activists trying to obtain better treatment for their suffering; or aboriginal groups trying to gain a seat at the governance table), which may make it even more difficult for them to pass an imitation game. For instance, if we compare Collins to the AIDS activists, it is noteworthy that Collins, as an academic, shares important aspects of his education and training with the physicists whom he's trying to imitate (e.g., as a result of having obtained a PhD and working at a university), unlike many of the AIDS activists.[12] This suggests that potential IEs who are in privileged positions, either in terms of their education or their social class, may have an easier time passing an imitation game than would others (e.g., lay communities), thus making it less likely that the latter will be seen as having legitimate knowledge. If this were the case, it would mean that potential IEs who have the least in common with contributory experts in terms of background assumptions and epistemological commitments may be the most likely to be ignored, thus failing to maximize the epistemic diversity of those communities. For this reason, an emphasis on passing an imitation game—namely, sounding exactly like the contributory experts themselves—reduces the ability of the potentially powerful concept of interactional expertise to fully realize the epistemic benefits discussed in the previous section.

While this issue of passing may be sociologically interesting, we feel that it's normatively problematic when one is asking who ought to be included in scientific and technological decision-making. Our concern is that passing the imitation game, while almost certainly sufficient for labeling someone an interactional expert, may set an overly narrow inclusion criterion, thus leading to missed opportunities to give legitimacy to those with important and relevant knowledge. Although Collins, Evans, Ribeiro, and Hall, (2006) themselves briefly acknowledge this, noting that the imitation game may "set an impossibly high standard" (p. 669),

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[11] We think this distinction between Collins and the AIDS activists is an important one to highlight—while some interactional experts will share aspects of their training and background with the contributory experts with whom they are interacting (such as having received a PhD or worked as a professional researcher), some will not, possibly making it more difficult for them to pass an imitation game. We return to this point in the last section of the paper.

[12] Although we don't have the space to explore this issue here, we think it is a problematic case of privilege to suggest that an already marginalized group ought to disassociate from their own identities and forms of expression in order to be accepted as having legitimate expertise by a more powerful group. (We thank Aimée Morrison for clarifying this point.) Not only does it place the burden of proof on those groups who are already marginalized, but it also places those who may have legitimate criticisms of the assumptions or practices of a group of contributory experts at a huge disadvantage, further maintaining the status quo.

they continue to operationalize IE in terms of the imitation game in subsequent publications. Unfortunately, this use of the imitation game as the indicator of IE may influence CEs and potential IEs, sending the message to both that only those who sound like CEs are to be listened to. Instead, what should matter is whether or not they can speak the language well enough to interact interestingly (and fruitfully) with contributory experts, not whether or not they would be able to deceive those contributory experts into thinking they're one of them (though we do agree that immersion is important for linguistic fluency).

The main problem, then, is the disconnect between operationalizing IE in terms of passing an imitation game (and the implications that arise from doing so) and the potential value that we see IEs as having, namely the unique insight they can provide owing to their different set of knowledge and experiences. Selinger and Mix (2004) have made a similar observation, noting that if the imitation game is the only way to measure interactional expertise, "we would miss the fact that their value as interactional experts lies precisely in their ability to 'interact' with contributory experts in a way that provides the latter with new understanding" (p. 149). In other words, rather than emphasizing homogeneity, as the imitation game tends to do, diversity amongst IEs should be emphasized, valued, and encouraged. At the same time, however, it is important to maintain the need for IEs to speak the language of a discipline so that they can interact fruitfully with contributory experts. Selinger and Mix point out that this can be assessed without the need for an imitation game: "in some instances, the proof of interactional expertise will not be decided upon by how well someone can fool a contributory expert, but rather, it will emerge from a dialogue in which both interactional and contributory expert leave the conversation changed, acknowledging that some presupposition needs to be reexamined" (2004, p. 150). While interactional expertise certainly has other benefits besides increasing diversity (e.g., acquiring IE in another field can aid sociologists, historians, and philosophers of science with their own work), we think their most significant value lies in what they can do for the very field in which they hold interactional expertise. As such, we think it is best to see IEs as being *different* from CEs, instead of "lesser than", where they're viewed as something akin to CEs minus an ability to practice. By focusing instead on the diverse perspectives that IEs tend to hold, we can emphasize the potential contributions they can make.

This leads to our last concern—that the current conception of IE, or at least the way that Collins and Evans discuss it, unnecessarily limits the role that IEs can play with respect to the area in which they hold interactional expertise. As we mentioned earlier, Collins and Evans hold that one of the main differences between CEs and IEs is that the former can *contribute* new knowledge while the latter cannot.[13] We disagree with this view. Not only do IEs have important expertise and experience to draw upon, and the linguistic ability to make their knowledge relevant and useful to the group of contributory experts with whom they're working, but we believe the fact that they're not CEs themselves gives them a unique perspective that may enable them to generate important ideas and insights. Underemphasizing the ability of IEs to make real contributions risks reducing them to mere providers of local knowledge who are beholden to the interpretive powers and skills of outside experts. This may lead to the types of 'unrecognized contributor' (or perhaps 'undervalued contributor') cases discussed by Whyte and

Crease (2010), which in turn may lead to missed opportunities to improve the trust, buy-in, and uptake of scientific knowledge and technical decisions among important stakeholder communities—the opposite of what's suggested by Grasswick (2010) for scientists looking to earn rationally grounded trust.

Now that we have identified some of the ways in which the current conception of IE—and in particular the emphasis on passing the imitation game—prevents many of the potential benefits of IE from being realized, we turn to an alternative account of IEs, one that we believe is in line with the original spirit of the concept presented in Collins and Evans (2002). As we see it, the development of the concept of IE was intended to extend the sphere of those who are considered legitimate experts, while also providing a more descriptively adequate account of expertise. The pluralistic account we provide is intended to bring the concept of IE in better alignment with both of these goals. In doing so, it offers a broader notion of IE that can better account for the diversity of IEs that actually exist and that is more inclusive in terms of who ought to be part of important scientific research and technical decision-making.

5. Proposing a more pluralistic approach

Despite the shortcomings that we identified in the previous section, we think that IE is a powerful concept. It fruitfully expands notions of expertise in order to identify and legitimize the knowledge and experience that those without formal education and training in a particular discipline may have with respect to it. However, as we've argued, we think the current conception of IE is too restrictive—largely owing to the way it's operationalized—and that returning to a broader conception would enable the concept to do more normative work. In particular, we believe that any characterization of IE should recognize and emphasize the importance of diversity, as well as the role that IEs can play in improving the practices, products, and uptake of scientific and technical research. In what follows, we propose a number of suggestions for how we can attend to the potential and actual diversity of IEs. These include focusing on IE's ability to interact interestingly (and fruitfully) with CEs rather than their ability to pass an imitation game; recognizing the various profiles that interactional experts can have as a result of who they are, why they've sought to acquire IE, and how they make use of it; encouraging and leveraging these diverse IE profiles; highlighting the epistemic benefits of having a diverse set of IEs; and acknowledging the contributions they can make. By no means is the account that we offer a complete one; rather, it is intended to identify some of the more important aspects of IEs and the role they can play with respect to scientific research and technical decision-making.

One key in building a more pluralistic account of interactional expertise is explicitly defining IEs through their abilities to interact interestingly with contributory experts, rather than their ability to pass the imitation game or their homogeneity with existing contributory experts. This broader notion of IE is in line with Collins and Evans' early work where they first use sociologists of science as examples of IEs, suggesting they have "enough expertise to interact interestingly with participants and carry out a sociological analysis" (2002, p. 254). Later in the same paper, they mention the ability of IEs to speak the language of a discipline as a result of being immersed in a community of contributory experts. We believe that these positive traits—i.e., possessing linguistic fluency, having been enculturated in the relevant discipline, and being able to interact with contributory experts in interesting and fruitful ways—are more important to emphasize than the exclusionary tests (e.g., the imitation game) or negative characterizations (e.g., an inability to contribute), and in fact, that one may qualify as an IE in the case where he or she displays those positive traits but may not be able to pass the imitation game.

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[13] Unfortunately, Collins and Evans don't say much about what it means to contribute, but they seem to suggest that IEs will not typically be able to come up with original and substantive epistemic insights on their own (except in rare occasions, as they note); rather, any contributions they do make will be indirect, by way of inspiring contributory experts to generate new ideas. See Plaisance, manuscript in preparation (b) for an in-depth critique of this view, and an account that allows for IEs to make direct contributions to the field in which they hold IE.

One of the reasons for this, hinted at above, is that the imitation game can test for markers other than linguistic ability and subject knowledge. These could range from cultural and social markers (e.g., not phrasing things in the same way as the standard demographic of scientists) to conscious objections (e.g., using different or atypical examples, or disagreeing with conventional wisdom in the field). Note that we aren't suggesting that some IEs would always fail the imitation game, nor that they couldn't pass if they were willing to subject themselves to the test and the judge was highly committed to assessing only the text of the replies. Rather, we're suggesting that some IEs might not be eager to subject themselves to such a test, others may wish to play up their differences, and overall, it risks sending a message that IE favors those who sound like conventional experts—furthermore, these three issues can occur in settings that compound exclusion and marginalization for already alienated groups. Thus, a more pluralistic account is needed, as these individuals might be unlikely to 'pass' the imitation game and are likely to be uncomfortable with the idea of 'passing' as an oppressive idea to begin with. To identify previously excluded categories, communities, and examples of interactional experts requires a more flexible sense of who might be included in such a category. Shifting towards a broader definition of interactional expert—one who has the linguistic ability to interact interestingly and productively with contributory experts—is part of the solution.

In addition to returning to a broader notion of who might count as an IE, it is essential to recognize that IEs are a diverse group. Existing work on interactional expertise presents a relatively interchangeable, homogeneous class of actors. Acknowledging that there may be substantial diversity and variation among IEs is a requisite step to noticing the existence and understanding the practice of IEs who may be dissimilar to sociologists of science as IEs. We suggest that a pluralistic account of IE needs to take into account at least three kinds of diversity: *who* the IEs are, *why* they've immersed themselves to obtain specialized knowledge, and *how* they go about putting their interactional expertise into practice. A pluralistic account sees these diverse positions as important because it captures the unique perspectives, ideas, and backgrounds that IEs can bring to the table. Indeed, just as interactional experts are valuable in a community of contributory experts precisely because of their different training, perspectives, and insights, so too is having a wide variety of backgrounds among IEs. Potential IEs may vary significantly, for instance, with respect to what we refer to as their social location. This includes dimensions such as gender, race, age sexual orientation, social class, and cultural background—all sorts of characteristics identified by feminist scholars as formative and constitutive dimensions that go on to influence their knowledge and perspectives.[14]

This diversity of IEs has epistemic import as well. In some cases, these characteristics put an IE—or a group of IEs—in a unique position to contribute to scientific research or to be able to offer important insights (e.g., by questioning disciplinary norms or not being expected to conform to shared assumptions). For example, someone from an Aboriginal community who has interactional expertise in a scientific discipline could serve as a productive and 'trusted' mediator between climate scientists and First Nations communities, which can lead to more effective working partnerships and more informed outcomes than would be possible with outside scientists alone (Whyte & Crease, 2010). Even more powerfully, acquiring interactional expertise may enable research projects to be co-designed, co-created, and co-produced by scientific and Aboriginal collaborators, incorporating the divergent perspectives and insights of a wider swath of collaborators into the foundation of a research project. Indeed, these benefits of unique perspectives are most significant and likely to be capitalized upon when the interactional experts involved are not trying to sound exactly like existing contributory experts, but are rather foregrounding their unique insights while being able to speak the language and understand the tacit assumptions of their collaborators.

Likewise, some potential IEs may have other expertise or experience that would affect their ability to acquire IE or put it into practice.[15] Case studies in the SEE literature have featured IEs with expertise in a different field (e.g., Harry Collins as a sociologist of science). These IEs may have an easier time navigating institutional and informal structures of expertise, earning credibility with which to share their ideas, and gaining access to relatively closed communities thanks to having a formal degree or set of credentials. This additional education or experience may also provide other benefits, such as practice in navigating interpersonal and interactive relations, autodidactical tendencies that support the self-directed learning process the IE has to immerse themselves in to gain disciplinary knowledge, academic aptitudes that make it easier to learn a new jargon or provide transferable reasoning skills, and reflective metacognitive abilities that make it easier to engage with and soak in new disciplinary knowledge. All of these dimensions are highly variable between IEs and while some might make portions of the enculturation process simpler, none is necessarily better than any other—they each simply offer different vantage points from which to be able to engage as IEs.

While each of these variables offers epistemic resources by which to engage as an interactional expert, each is also associated with visible indicators that may make it more or less likely that they are able to pass during an imitation game. In fact, it may be that unique perspectives and diverse life experiences are generally correlated with those traits that make one more obviously atypical during an imitation game. This is where we see the value in a pluralistic approach to IE: it provides a way to ensure that experts aren't bombarded with outside perspectives—IEs must know the key concepts, be able to speak the language, and understand the expert community—while ensuring that the imitation game doesn't serve to exclude the most diverse individuals.

Like skills and aptitudes, motivations for acquiring IE can also vary tremendously between interactional experts, and can change even for a single individual given time and experience. Several reasons exist for wanting to take on such an intensive immersion experience. Kennedy argues elsewhere that there are at least four different kinds of motivations that could drive the acquisition of interactional expertise.[16] Some IEs do so with an overt mission of learning, such as in Collins' own experience as a sociologist profiling a community. While these 'learners' have a desire to pick up as accurate a sense of the language as possible, 'challengers', such as Epstein's AIDS activists, desire instead to maintain their own identity and influence an expert community in a certain, generally predetermined direction. Others could take on the role of a 'facilitator', such as the trusted mediators described by Whyte and Crease (2010) who gain IE with the goal of being able to further accurate and meaningful communication between differing groups, and are thus characterized by using the language in an instructive, cross-community fashion. Somewhat similarly, 'collaborators' acquire IE as a step towards a mutually intelligible language or trading zone by which to work together on a transdisciplinary project (Gorman,

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[14] See Code (1981); Longino (1993); and Wylie (2003). For an overview of these accounts, see Grasswick (2013).

[15] Epstein, for instance, highlights that the AIDS patient activist movement was affected by the fact that several of the prominent and successful patient community members were already medical professionals in related fields.

[16] See Kennedy, manuscript in preparation.

2010). IEs can have multiple motivations (e.g., a philosopher of science who is both learning about the community they're immersed in, but is also collaborating with the aspiration of developing mutually beneficial outcomes), or motivations that shift over time (e.g., the challenger who decides that it is more important to attempt to facilitate effective cross-community communication).

These motivations can play a powerful role in the kind of enculturation experienced by each party. A challenger who sees the IG as hostile, but also takes a critical stance towards the established community, would have a very different personal experience (as well as impact on the expert community) than a collaborator who holds goals of mutual intelligibility and improving both party's learning and understanding. The motivations also result in varying degrees to which it's alright for the developing IE to give up their identity in exchange for admission to the expert community, versus engaging in a struggle to maintain one's own community affiliation while still learning the language of the other group. Collins, for instance, likely had little need to worry about losing his identity while taking on a traditional sociological role of visiting ethnographer. By contrast, Plaisance cites an intentional experience of revealing and maintaining the identity of her outside affiliation while immersed in a community of scientists, as it was precisely Plaisance's different viewpoint that led the scientists to solicit and value her input.[17] Furthermore, the facilitator might have a strong pragmatic desire to be seen in a sort of neutral position and not too closely affiliated with either community, while certain types of challengers would place a great deal of value in maintaining their membership and identities in other distinctive communities. Accordingly, these variable motives can have a significant impact on how one defines their role as an IE, and how one reacts to the prospect of being put through the IG.

Taken together, the social locations and motivations of IEs can have a profound impact on each individual's practice of IE. In addition to their independent effects (e.g., other expertise making it simpler to gain access to academic circles, or the motivation behind the IE leading to differing views on how much of one's independent identity ought to be maintained), the social locations and motivations combined can have an impact on how IE is developed and maintained. A combination of an IE being an aspiring collaborator and having ready institutional access (e.g., collaborating with a nearby, open department) might make it quite easy to maintain an ongoing immersive experience via informal socializing, public events, and friendships with fellow collaborators in the target discipline. By contrast, a challenger coming from a very different social class and lacking in any formalized academic training or institutional affiliation might have a radically different experience—one characterized by being excluded, finding it difficult to develop networks and confidantes from which to learn, and where ongoing immersion requires specific and intentional meetings or interviews.

These combinations would also impact the ongoing practice of interactional expertise. For a sociologist of science, it may be sufficient to gain immersion for the duration of a scope-bounded project, wherein the outcomes and goals of the project are relatively well defined and the linguistic immersion is the principle goal and subject of the study. For someone who finds themselves in a cultural mediating role, however, interactional expertise would take on a very different meaning and become a process of mutual sense-making characterized by trying to develop understandings and shared perceptions around experiences and concepts, while having very little to do with the language itself. In other words, while the sociologist or philosopher might regard the language as part of the study (e.g., how terms are defined within the lab), the facilitator might use the language in a very tacit way while trying to

draw out the differences behind underlying assumptions and beliefs. Indeed, there are a multitude of ways in which the combination of various motivations, social locations, and experiences could result in very different instantiations of interactional expertise—hence the need to be able to recognize, understand, and validate through a more pluralistic model.

Thus far, we have emphasized the fact that a diverse set of interactional experts can bring forth a unique and valuable set of experiences, perspectives, and skills. It's important to note, however, that on our account, IEs can do more than simply inspire contributory experts to generate important ideas and new knowledge. Instead, we suggest that interactional experts can make significant contributions to a discipline precisely because they have a different background and because they're able to interact interestingly and productively with traditional experts. Both of these elements are important. Without the ability to speak effectively through shared linguistic abilities, one would not be able to communicate nor understand the contributions they were making. Nor, however, could these kinds of contributions occur without an underlying commitment to diversity and the reality that heterogeneous interactional experts are valuable precisely because their training and experiences differ from those of the contributory experts.

The idea that only CEs can advance the knowledge in a field may hold true for knowledge specific to the embodied skills—that is, work that must be physically done within the lab. So too might it be true for those who are only temporarily immersed in a field, or who don't view making contributions as central to their aim. Yet, for some interactional experts, contributions end up arising from their increasing understanding, unique perspectives, and desires to collaborate (such as [author's name suppressed for review] work, initially researching the use of terms in the behavioral genetics community, but eventually leading towards contributions via conceptual clarification for those disciplines). Selinger and Mix make a similar observation with respect to Epstein's study of AIDS activists: "Activists often develop interactional expertise to affect how a practice should be understood and conducted. They aim to make contributions in a field by means of the persuasive powers that their apprenticeship into linguistic socialization sometimes affords" (Selinger & Mix, 2004, p. 148). Indeed, not only can interactional experts make contributions, but they may also be in a better position than contributory experts to generate certain ideas, thanks to their unique experiences and perspectives.

Not only are interactional experts capable of offering unique perspectives that yield valuable contributions to existing disciplines, but there are also other benefits that go along with including new communities in scientific work and decision-making. For example, feminist scholars like Heidi Grasswick (2010) and Naomi Scheman (2001) argue that earning the trust and acceptance of stakeholder communities is an epistemic consideration. In other words, that scientific communities ought to have an obligation for making their knowledge claims universally acceptable by addressing 'rational distrust' that marginalized groups might have with the scientific enterprise, such as a history of racism or being excluded from benefits. A pluralistic approach to interactional expertise can play an important role in addressing this need by including new communities throughout scientific deliberations, either by enabling the participation of new voices who have become interactional experts, or through the scientists or trusted mediators playing a facilitative role in addressing stakeholder concerns and views early, accurately, and with continual engagement.

Adopting a pluralistic approach to interactional expertise has both descriptive and normative benefits. As we discussed above, it allows us to more accurately attend to, describe, and collaborate with a wide array of interactional experts. A pluralistic approach, however, is also important for normative issues like who we should

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[17] See Plaisance, manuscript in preparation (b) for details.

encourage to become an IE and how we should encourage them to go about training and behaving as such. The view we've presented here provides a wide range of motivations that could drive interactional expertise, as well as laying out the fact that it's a possibility regardless of background and prior experience. It allows us to affirm and validate diversity more explicitly, as well as being aware of systemic ways that certain groups may be excluded from this new form of expertise, and finding solutions to help reduce these institutional and cultural barriers. We can leverage this plurality of approaches as a resource, and provide a set of role models and exemplars of interactional experts from each style and approach. In essence, not only does adopting a more pluralistic view of interactional experts lead to more accurate descriptions of those who exist today, but it allows us to encourage and raise up a host of new types of diverse interactional experts in the future.

6. Conclusion

Interactional expertise provides a powerful framework for addressing the question of extension—namely, who ought to be included in scientific knowledge and decision-making? It provides us with a useful way of moving beyond expert/non-expert dichotomies and offers a richer, more nuanced terrain with respect to the issue of specialist expertise. It also offers a practical sense as to how to go about acquiring this type of expertise (i.e., through enculturation, linguistic exposure, and ongoing practice). As we've argued here, IE has the potential to provide a number of benefits regarding the creation and uptake of scientific knowledge. By helping to identify those with potentially relevant experience and expertise, and legitimizing their knowledge, the use of this concept can lead to scientific research that recognizes a more diverse set of epistemic resources, which can translate into more objective knowledge claims according to theorists like Helen Longino. Furthermore, it can also aid in the uptake of scientific knowledge, which philosophers Naomi Scheman and Heidi Grasswick argue is a constitutive goal of science, by helping contributory experts acknowledge the potential contributions of lay communities and other stakeholders, which leads to an increase in rationally grounded trust.

Yet, as we also demonstrate here, IE hasn't reached its potential for identifying and legitimizing these non-traditional experts, and thus isn't able to fully achieve these benefits in its current form. The main reason for this, we argue, stems from focusing on the imitation game as the indicator of IE, where potential IEs must be able to sound just like the relevant contributory experts. This leads to an overly narrow conception of IE, an emphasis on homogeneity among interactional and contributory experts, and an unnecessarily limited role for IEs (particularly with respect to their potential contributions to their domain of IE).

In order to address these problems, we suggest deemphasizing the role of the imitation game, broadening the notion of IE in a way that attends to the diversity of IEs that exist, and acknowledging the value that IEs can bring to the table in terms of their unique perspectives. We believe that doing so will make it easier for non-traditional experts with relevant knowledge and experience to be recognized and valued, which can bring a host of benefits to scientific research and decision-making. As we have intimated above, the pluralistic account we offer gives the concept of IE normative force, not only by broadening the circle of non-traditional experts who ought to be included in scientific and technical decision-making, but also by providing an important resource for normative theories that call for a diverse set of perspectives in order to improve the creation, uptake, and application of scientific knowledge. Overall, we hope that the analysis provided here is useful not only for theoretical debates regarding the nature of expertise, but also provides tangible guidance for real-world practice.

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