Experts

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1   Introduction

We consult experts or even rely on expert judgments in court, daily life, politics, and science. For this reason, it is necessary to clarify what an expert is and how to recognize experts to understand, justify, and improve the various practices of trusting, using, and relying on the judgments of (groups of) experts. Accordingly, this entry's structure is as follows: Section 2 discusses the primary features of experts. Section 3 discusses how to recognize experts and expertise. Finally, Section 4 provides a summary and an outlook to further work on this topic. See the entry DEFERENCE TO EXPERTS for a discussion of when and how we should rely on experts.

2   Characterizing Experts

It is standard to distinguish accounts of expertise that concern (i) skills and thus knowledge-how and (ii) accounts that concern cognitive or intellectual achievements, such as knowledge(-that) (Goldman 2001: 91). Goldman mentions "violinists, billiards players, textile designers" as examples of experts of the former kind (Goldman 2001: 91); they are often referred to as 'performative experts'. Scientists count as examples of experts of the latter kind. They are frequently called 'cognitive' or 'intellectual experts' because, as Grundmann (forthcoming) puts it, they "competently produce *judgments*". We join Goldman (2001: 91) in acknowledging that there is no strict line between these kinds of experts; nevertheless, we focus on cognitive experts in this entry. (The task of finding a characterization that jointly applies to performative and cognitive experts is much more complex; for example, Montero 2016 and Quast 2018). Cognitive experts play a more central role in epistemological debates.

No definition of 'expert' or 'expertise' is widely accepted (Quast 2018: 12, similarly, Quast & Seidel 2018: 1), and Scholz (2018: 29) even argues that one should not attempt to provide a definition but look for "symptoms of expertise". The literature commonly assumes that experts have reached some epistemic achievements: they have acquired a fair amount of true beliefs, evidence, knowledge, rational or justified beliefs, understanding, etc. Sometimes, the literature also assumes experts have particular abilities that enable them to reach further epistemic achievements and help others achieve them. With these intuitions in mind, we discuss below the characteristic features of experts that are often considered necessary or sufficient for expertise. We think we better not present a single characterization or definition of experts. Different kinds of experts are good at different cognitive tasks, e.g., acquiring evidence, knowledge, rational belief, understanding, etc. In this entry, we want to avoid taking a stand on which tasks are more important.

Kinds of Epistemic Achievements   In the literature, all potentially sufficient or necessary conditions for being an expert refer to epistemic achievements. Thus, a significant debate concerns the question of which kinds of epistemic achievements are relevant for expertise. In debates on experts, epistemologists understand epistemic achievements as beliefs that are true (Goldman 2001), that have been acquired through reliable skills (Grundmann forthcoming), that constitute knowledge (Licon 2012), or beliefs that would almost certainly be knowledge (Fricker 2006).

Such approaches have been criticized for not considering other epistemic achievements, such as understanding (Scholz 2009). Taking understanding into account would provide an alternative explanation of why people who exclusively rely on others to form their beliefs cannot be experts (Croce 2019). In contrast to knowledge and justified belief, understanding cannot be obtained by mere reliance on testimony (cf. Grundmann forthcoming and Understanding and Transmission).

Grundmann (forthcoming: Sect. 1) denies that understanding is a sufficient or necessary condition for being an expert. He suggests that the famous mathematician Ramanujan had no mathematical understanding because he could not provide proof (in the standard form required at the time). Nevertheless, Ramanujan was a mathematical expert for Grundmann because his mathematical insights were a reliable guide to finding new theorems. Grundmann's description of Ramanujan can be contested. Ramanujan's mathematical insights and capacities, as described by Hardy (see Newman 1956: 375–376), his host at Cambridge, seem to exemplify prototypically "grasping," i.e., the standard precondition for understanding (see Grimm 2021). A more general criticism is that it is not sufficiently precise what kind of epistemic achievement understanding (and, to some extent, knowledge) are and that one should not try to characterize experts in this way.

Finally, some attempts to characterize experts also refer to epistemic failures and require that experts avoid them. Goldman (2001), for example, claims that experts in their field have more true beliefs than most others and fewer false beliefs. Similarly, avoiding misunderstanding or ignorance could be a requirement for characterizations of expertise in terms of understanding or knowledge.

Domain and Time   The literature assumes that being an expert should be relativized to a specific domain and time. Expertise should be relativized to a domain because what counts as an epistemic achievement differs from domain to domain. People are often experts in one domain but not in another one. Whatever the relevant epistemic achievements or abilities for expertise in a domain are, agents can obtain epistemic achievements and abilities in one domain and lose them over time. Accordingly, for each domain, agents can be experts at a specific time and not be experts at another time. Having emphasized the relativizations to the domain and time, we will, for the sake of space, silently assume them without mentioning them any further unless it is required for clarity.

Better than Others   Open to debate is whether it is sufficient or necessary that experts have obtained more epistemic achievements than most or are in some epistemic sense better than average. Undoubtedly, experts should be better than non-experts, but as the following quote shows, many also believe that experts are better than most.

> Surely, experts should be better equipped, than their non-expert peers, to handle novel problems relating to their field of expertise. Put differently, an expert in X should have methods and heuristics to [be] able to apply to novel situations that arise related to her area of expertise. Put differently: an expert with respect to X should have greater knowledge-that and knowledge-how than most of her peers, *ceteris paribus*. (Licon 2012: 451)

Similar better-than-most conditions can be found in the work of Goldman 2001, Grundmann forthcoming, Scholz 2009, and Quast 2018. A consequence of comparative approaches is that even though Newton's epistemic achievements (and avoidance of epistemic failures) mark him as an expert of his time, these achievements might not suffice in comparison to the epistemic achievements of today's experts.

Satisfying this comparative condition is insufficient for being an expert because doing epistemically better than most is easy for an educated grown-up in a population with many children. Indeed, if it were a sufficient condition, it would plausibly imply for many domains that 49% of the respective population are experts. A possible criticism against this being a necessary condition is that there could be domains where all people are experts. Because there is nothing more to be discovered, all is common knowledge and well-understood. Similarly, Watson critically remarks that it is intuitively not the case that if all the laypeople in a domain were wiped out, the majority of the remaining experts would lose their status as experts (Watson 2021: 57).

Above a Threshold While Goldman thinks being better than most is necessary, he also emphasizes that this comparison does not suffice for being an expert. Experts should also reach a certain threshold: "Some non-comparative threshold of veritistic attainment must be reached, though there is great vagueness in setting this threshold" (Goldman 2001: 91, see also Goldman 2018: 5 and Grundmann forthcoming). Watson (2021: 61f.) critically remarks that even Newton or some other great figure from the past might never have been an expert, depending on the chosen threshold. He argues that most of the astrophysical beliefs of Newton and Copernicus have been false. Watson (2021) suggests relativizing the threshold to time, too. Newton and Copernicus surpassed the threshold of their time. Accordingly, they might not pass the threshold condition since they had no reliable access to truths in their domain. A more general criticism is that it is hard to determine how epistemic achievements within a domain could be quantified and how the threshold for expert-hood should be set based on such a measure. How much of all the possible knowledge about physics must one have amassed to have enough knowledge to qualify as an expert?

Backward- and Forward-Looking Features The literature assumes that agents must have reached some epistemic achievements in the past to count as experts; this is a backward-looking feature of experts. However, experts are also expected to be capable of reaching new epistemic achievements in the future (Goldman 2001); this is a forward-looking feature. Goldman emphasizes this for what he takes to be the relevant epistemic achievements:

> It includes a capacity or disposition to deploy or exploit this fund of information to form beliefs in true answers to new questions that may be posed in the domain. [...] So expertise features a propensity element as well as an element of actual attainment (Goldman 2001: 91-92, cf. Grundmann forthcoming: Sect. 1).

For the required abilities, one can again debate whether being an expert requires being better at reaching new achievements within the domain than most or above a certain threshold. Either way, requiring such abilities ensures that people who can only reach epistemic achievements in a domain by adopting what others believe do not count as experts (see also Grundmann forthcoming Sect. 1.). They cannot contribute autonomously to finding answers to new questions. The main worry concerning requiring abilities to obtain new epistemic achievements is that there might be domains in which this is impossible. Grundmann (forthcoming) raises such a worry in the context of track records (discussed in the next section). For example, for being an expert regarding the writings of Roman emperors, backward-looking features are certainly more important. Nevertheless, even in

these domains, new achievements might be possible, e.g., when the author of a newfound manuscript must be identified.

(Social) Role of Experts Experts take on essential roles in our societies because of their superior expertise. Some philosophers suggest that it is characteristic of experts to play these specific social roles. For example, Goldman (2018: 3) considers an account of expertise according to which a "person is an expert only if s/he has a reputation for being one." Such accounts have problems explaining quacks or charlatans. If persons are in the social role of experts or have a reputation for being one, it seems self-contradictory to call them fakes. Similarly, one might also want to acknowledge that there are experts who betray the trust and the role society grants them (see Oreskes & McConway 2010).

Alternatively, one might suggest that experts can fulfill the expert role competently (but do not necessarily do so). Quast (2018) suggests that experts are skilled in helping laypeople reach achievements (for Quast, they may concern any product or task, not just epistemic achievements). Croce 2019 suggests that experts are adept at promoting science. Unfortunately, it is unclear what this requires explicitly. Croce (2019) believes that understanding is necessary but insufficient for fulfilling the experts' research-oriented social role. However, cannot everyone who possesses knowledge that others do not have help others and promote science? Suppose we apply higher standards to the ability to promote science. Does this mean most doctors, engineers, and architects are no experts because they use science but typically do not contribute to it? Grundmann (forthcoming: Sect.1) objects against any such attempt to characterize experts because an expert might "lack essential capacities for scientific collaboration," e.g., by having "lost [the] ability to speak and write due to a recent stroke". It is hard to evaluate this intuition. With the help of technical assistance, the scientist Stephen Hawkings was able to contribute to science and educate laypeople under severe health conditions. However, perhaps we would intuitively not label someone an expert if even the most elaborate metaphysically conceivable technical assistance (e.g., a mind reader) would not allow that person to advance science. See Grundmann's forthcoming for a detailed discussion. A more general worry against characterizations of experts in terms of their social role is that experts play multiple roles in one society and different roles in different societies. Arguably, the expert legal scholars of ancient Rome, the 'Gentleman researchers' of the British imperium, and the economists of today play(ed) very different roles in their respective societies. However, they have more in common than their social roles indicate, such as their superior epistemic achievements and abilities.

3   Recognizing Experts

The challenge to recognize experts or their expertise, when one is an expert (in that domain), goes under the heading 'expert/expert problem' (Goldman 2001: Sect. 2). It is famously investigated by Kitcher (1993). The challenge to recognize experts or their expertise, when one is not an expert (in that domain), is labeled 'layperson/expert problem' (Goldman 2001: 86 and Sect. 2). (To be precise, Goldman refers to the latter as the 'novice/expert problem' and traces it back to Hardwig 1985. We prefer the much broader term 'layperson/expert problem' to include different kinds of laypeople besides novices, who "aspire to acquire epistemic competencies in the relevant domain" (Jäger, forthcoming: Fn.2). In the following when we refer to Goldman, we do so as if he talked about laypeople too. Goldman discusses a third problem, which is closely related: "The novice/2-experts problem is whether a layperson can *justifiably* choose one putative expert as more credible or trustworthy than the other with respect to the question at hand, and what might be the epistemic basis for such a choice" (Goldman 2001: 92). Due to lack of space, we will concentrate on the first

two problems here.)

It is generally assumed that there are no criteria that we can use to identify experts with certainty. Thus, the literature critically discusses the strength of various indicators of expertise (Goldman 2001, Goldman and O'Connor 2019, Grundmann forthcoming, Kitcher 1993, Martini 2019, Scholz 2009). In the following, we examine some of the indicators discussed in the literature.

Track Record One significant indicator of expertise is an agent's track record. One can determine whether a doctor's diagnosis and treatment were correct by observing her patient's subsequent condition (Goldman 2001: 108). Or consider, as Goldman and O'Connor (2021: Sect. 3.6) suggest, a broker whose advice on investment can be judged based on its dividends. Similarly, cognitive experts can be judged based on the track record of their past epistemic achievements. Track records, of course, should only list achievements that have been reached independently of others. For example, one cannot inherit Einstein's track record by adopting his beliefs.

Again, the relevant question is what kinds of epistemic achievements should be tracked. Many disciplines keep track of the experts' predictions and whether they have been accurate. Evaluating an agent's predictions would be a typical method to assess the track record of a weather forecaster, for example. Grundmann (forthcoming) criticizes that such track records are not helpful for disciplines that do not make predictions, such as mathematics and history, or that are notoriously bad at it, such as economics. However, as already noted by Hempel (1965) and emphasized by others (e.g., Douglas 2009: 446), predictions in the epistemic sense aim at anticipating unknown facts, whether they concern events that lie in the future, present or the past or are facts that hold in general. In addition, predictions are not the only epistemic achievements one can keep track of. Finding new and relevant data, devising crucial experiments, providing proofs, and suggesting new models or methods are all legitimate epistemic achievements we can keep track of.

Unfortunately, as Goldman (2001) notes, it can be challenging for laypeople to track the epistemic achievements of an agent in certain domains (e.g., particle physics). Goldman, however, also notes that in certain domains, even laypeople can, to some extent, track the performance of experts although they are no experts themselves (e.g., weather forecasts in one's region). Nevertheless, for other experts, an agent's track record is one of the most critical indicators of her expertise. Thus, track records are strong indicators of expertise, but for laypeople, it is hard to identify and judge an agent's track record in some domains. At least partially, the layperson/expert problem remains.

Argumentative Competence: Justification and Evidential Support A possible indicator of expertise is argumentative competence, e.g., the ability to criticize and improve arguments. Accordingly, we obtain evidence relevant to assessing this agent's expertise by examining an agent's justifying arguments, the evidence and theoretical knowledge available, and how they seeks to support claims evidentially. When the arguments are convincing–e.g., when the premises are plausible, the arguments valid, or the judgment well supported by the evidence–this is prima facie evidence that this agent has considerable expertise in the relevant domain. Goldman and O'Connor critically point out that laypersons often cannot evaluate experts' argumentative competence (Goldman 2001: 94 and Goldman and O'Connor 2021: Sect. 3.6). Thus, this indicator is of minimal use for the layperson/expert problem.

A variation of the argumentative competence indicator might be the agent's competence in teaching laypeople or promoting science more generally. This revised indicator certainly would be more accessible to laypersons. Grundmann (forthcoming) emphasizes critically that laypeople with excellent rhetoric and teaching skills might do better than experts in communicating relevant information. Similarly, experts with poor rhetoric and teaching skills might be bad teachers and communicators. Accordingly, this variation of the indicator is also of minimal use.

However, besides an agent's track record, the agent's argumentative competence is perhaps the strongest indicator of expertise concerning the expert/expert problem. However, it is hard for laypeople to identify and judge an agent's argumentative competencies. It indicates possessing more information or being able to manipulate it (Goldman 2001: 94-95).

Agreement with Other Experts Another possible indicator of expertise is agreement with experts (see, e.g., Kitcher 1993). Roughly put, if agent a is in epistemic agreement with expert e, then it is likely that a is an expert, too. The more experts agree with a on a specific claim, the more expertise we can ascribe to a concerning that claim. This indicator is criticized by Goldman (2001: 97).

First, agreement among experts indicates truth and expertise only if the agents are sufficiently independent. If an agent agrees with an expert by relying entirely on that expert's beliefs, the first is not an expert. If the agent arrived independently at the same conclusions, we would evaluate this differently; for a detailed discussion of the role of expert autonomy, see Delssén 2018. Similarly, if the experts are not sufficiently independent, agreement with most experts is not necessarily an indicator of truth (see the literature on the Condorcet Jury theorem.) Goldman (2001: 98) and Goldman and O'Connor (2021: Sect. 3.6) provide the worst-case scenario: the example of a guru whom many follow. Even if that guru were an expert, the number of his followers is irrelevant for judging his expertise, and his "slavish" followers are no experts either.

Second, one can only use agreement with experts to assess expertise when one knows who the experts are. Like rumors, false beliefs can be prevalent in non-expert communities. Assume that the guru in the above example is not an expert. Misjudging which group we should select as the one setting the standards for expertise will have severe consequences for assessing other agents' expertise.

Accordingly, agreement with other experts alone is merely a weak indicator of expertise. An agent needs to be sufficiently epistemically autonomous; mere agreement with other experts is not an indicator of expertise, not even for other experts. Experts assess an agent's epistemic autonomy by focusing on track record and argumentative competence, not just on agreement. In addition, it is difficult for laypeople to apply this indicator properly, so the layperson/expert problem remains.

Credentials: Education, Awards, Scientific Selection, and Meta-Experts An indicator of expertise that we often use in everyday life is the expert's credentials: their education, their university degrees, academic achievements and awards, etc. Goldman notes that credentials should be treated as a proxy for agreement with experts because "established authorities certify trainees as competent when they are satisfied that the latter demonstrate (1) a mastery of the same methods that the certifiers deem fundamental to the field, and (2) knowledge of (or belief in) propositions that certifiers deem to be fundamental facts or laws of the discipline" (Goldman 2001: 97). However, we don't think that all credentials should be treated as a proxy for agreement with experts. Some credentials are typically awarded based on track record and argumentative competencies, e.g., PhDs and publications in research journals. One cannot obtain the highest academic credentials by agreeing with others. Instead, they are awarded to those who can *make* other experts agree with them, e.g., by convincing others of beliefs they did not have with new evidence or arguments or by establishing new methods.

Unfortunately, according to Goldman and O'Connor (2021: Sect. 3.6), laypeople often do not have the competence to evaluate this indicator of expertise properly. This is, of course, true when laypeople want to compare experts whose credentials differ in detail. However, when there are more substantial differences, it might be more accessible. Anderson, for instance, presents a "hierarchy of expertise" based, among others, on people's education and recognition in a domain. Lowest are

laypeople, followed by "[p]eople with a B.S. degree, a B.A. science major, or a professional degree in an applied science speciality far removed from the field of inquiry in question" and highest are "*leaders* in the field" in question, who received high recognition by being admitted to societies and academies or having won prestigious prizes (Anderson 2011: 146-147). Credentials function as indicators in layperson/expert and expert/expert problems, provided one trusts the institutions that issue these credentials. However, what about domains for which there is no formal education, academic award, etc.? Who were the computer science experts in 1953 when the first computer science study program was founded? Similarly, one can only use credentials as indicators if one knows a scientific community's relevant institutions.

Accordingly, credentials are only strong indicators of expertise for laypeople, provided that two conditions are satisfied. First, they only aim at a coarse-grained estimate of an agent's expertise. Second, they trust and understand, to some extent, the relevant authorities that warrant the credentials.

4   Conclusion and Outlook

Concerning characterizing experts, we endorse that 'expert' and 'expertise' are best understood as domain and time-relative notions. We suggested they are best analyzed based on the experts' epistemic state and achievements and should include backward- and forward-looking features. We believe this is what allows experts to play varying roles in different contexts and societies.

Concerning how one can recognize experts, the entry discussed various indicators of expertise. Two strong indicators of an agent's expertise were the agent's track record in obtaining epistemic achievements and the agent's argumentative competencies. Unfortunately, these indicators are complex for laypersons to obtain and interpret correctly. The agent's credentials are the only strong indicator of expertise that laypersons can apply readily. This latter indicator is constrained because it only allows for a coarse-grained estimate of an agent's expertise. One needs to trust and understand the relevant authorities that warrant the credentials.

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