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AI and the expert; a blueprint for the ethical use of opaque AI

Amber Ross[1]

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Abstract

The increasing demand for transparency in AI has recently come under scrutiny. The question is often posted in terms of "epistemic double standards", and whether the standards for transparency in AI ought to be higher than, or equivalent to, our standards for ordinary human reasoners. I agree that the push for increased transparency in AI deserves closer examination, and that comparing these standards to our standards of transparency for other opaque systems is an appropriate starting point. I suggest that a more fruitful exploration of this question will involve a different comparison class. We routinely treat judgments made by highly trained experts in specialized fields as fair or well grounded even though—by the nature of expert/layperson division of epistemic labor—an expert will not be able to provide an explanation of the reasoning behind these judgments that makes sense to most other people. Regardless, laypeople are thought to be acting reasonably—and ethically—in deferring to the judgments of experts that concern their areas of specialization. I suggest that we reframe our question regarding the appropriate standards of transparency in AI as one that asks when, why, and to what degree it would be ethical to accept opacity in AI. I argue that our epistemic relation to certain opaque AI technology may be relevantly similar to the layperson's epistemic relation to the expert in certain respects, such that the successful expert/layperson division of epistemic labor can serve as a blueprint for the ethical use of opaque AI.

Keywords AI Ethics · Opacity · Transparency · Explicability · Social epistemology · Expert testimony

1 Introduction

Does the widespread demand for increased transparency in AI impose an epistemic double standard on the judgments made by AI models? And if so, are those double standards justified? Should we hold AI technology to the same standards of transparency that we hold an ordinary human reasoner? These questions are beginning to receive attention in the AI ethics literature, but to date there is minimal consensus. Zerilli et al. (2019) argue that much of our current proposed regulations would hold AI to higher than normal—and higher than necessary—standards of transparency. Günther & Kasirzadeh (2022) hold that, while there may be a double standard for ordinary human judgments and judgments made by AI , those heightened standards for AI technology are appropriate.

Amber Ross
amber.ross@ufl.edu

[1] Department of Philosophy, The University of Florida, Gainesville, FL, USA

Though they disagree on what the standards for AI transparency ought to be, all parties seem to accept that the standards to which they should be compared are our standards for transparency in the judgments of ordinary human reasoners. This makes sense, insofar as one's own decision-making process is thought to be transparent to oneself, while the reasoning of other minds is notoriously opaque. And in high-stakes decisions, or contexts in which fairness is an issue, we certainly require at least some degree of explanation or transparency before we will accept a person's judgment as fair and well grounded. Though we may not demand a full accounting of the reasoning process that ordinary people engage in when they make these judgments, our standards require that, at minimum, they ought to be able to provide an explanation of their reasoning that makes sense to most other people.

While I agree that the widespread push for increased transparency in AI deserves closer examination and that comparing these to our standards of transparency for other opaque systems is an appropriate starting point, I believe that a more fruitful exploration of this question will involve a different comparison class. While our most ubiquitous

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standards of transparency are those that apply to ordinary human reasoners making ordinary decisions, there is another familiar class of judgments to which these ordinary stand- ards of transparency do not apply. We routinely treat judg- ments made by highly trained experts in specialized fields as legitimate or well-grounded even though—by the nature of expert/layperson division of epistemic labor—an expert will not be able to provide an explanation of the reasoning behind these judgments that makes sense to most other peo- ple. Despite this fact, most other people (those who are not experts in the particular specialized field) would be acting reasonably—and ethically—in deferring to the judgment of experts regarding matters that concern their area of speciali- zation. I suggest that we might make progress on questions regarding the appropriate standards of transparency in AI by reframing the question as one that asks when, why, and to what degree it would be ethical to accept opacity in AI. As I will argue, our relation to some opaque AI technology may be sufficiently similar to the ordinary layperson's relation to the specialized expert such that analyzing the successful expert/layperson epistemic relation may provide us with a blueprint for how to best utilize opaque AI, both practically and ethically.

The general organization of this paper will be as follows: In Sect. 2, I will discuss the general value of allowing for the kind of opacity that exists in the expert/layperson relation. In Sect. 3, , I will address the value of transparency in decision- making, focusing on automated decision makers (ADMs) and the problem of bias in machine learning. In Sect. 4 I will explore areas of ethical concern *beyond* bias. Fairness is one value among many that must be considered when developing guidelines for the ethical use of AI. I believe an overly concentrated focus on the problem of bias in AI has drawn our attention away from other values that need to be considered in a full-cost accounting of our use of AI. It is the presence of these additional considerations that show why, in certain cases, allowing for opacity in AI technology may be ethically preferable to a constant pursuit of transpar- ency. In Sect. 5, I will argue that the call for transparency in AI is mainly in service of a separate end—that transpar- ency serves as a proxy for the trustworthiness of opaque processes, and increasing transparency aims at establishing appropriate levels of trust between stakeholders and opaque AI. If this is correct, we may be ethically permitted to utilize opaque AI technology provided that this trust and trust-worthiness can be established through alternate means. In Sect. 6, I will give an overview of several fundamental fea- tures of the expert/layperson relation and make a case for the possibility that the relation between stakeholders and opaque AI could display these features as well. These features will provide a skeletal blueprint for the ethical use of opaque AI. In Sect. 7, I will suggest preliminary guidelines for evaluat- ing contexts in which it may be ethical to employ opaque AI technology, consistent with the blueprint adapted from the successful expert/layperson relation.

2 The value of harnessing opaque processes

As a society, we reap enormous benefits from relying on—or deferring to—expert judgments, especially in high-stakes contexts. Our division of epistemic labor allows laypeople to benefit from the knowledge and judgments of special- ized experts without understanding *how* the experts arrive at these judgments nor *why* those judgments are justified. If there is such a thing as scientific progress, discovering how to effectively utilize this division of epistemic labor is the foundation of that progress.

Our reliance on opaque expert reasoning is so common that it usually passes without our notice. It may be as trivial as relying on the weather forecast when planning a vacation, or as significant as deciding whether to evacuate our homes (risking our lives and livelihoods) because we know we are in the path of a hurricane. In modern society, one does not need to understand the nature of carbon monoxide or nuclear reactions to know that certain levels of CO in the home can be deadly, or that certain nuclear power plants are safe to live near. We can make ethically responsible decisions, including high-stakes decisions, without fully understanding the reasoning process on which we are basing our decision, because it is both epistemically and ethically responsible for us to defer to experts in these matters.

For the vast majority of society, the evidence and reason- ing processes of any expert in a specialized field is opaque, a genuine "black box". Though it is often in our best inter- est to defer to these experts' judgments, in doing so we are accepting the outcome of a process that we are aware we do not understand. We individuals who are not experts in a particular specialized field– can know far more than we have the capacity to understand, because relying on expert opinion is a reliable way to build knowledge and an ethi- cally responsible way to decide how to act. A medical expert can only make their reasoning and evidence understanda- ble to a layperson to a certain degree; for that reasoning to be fully transparent to the patient, the patient would need to undergo training similar to that which the doctor underwent to become an expert in their field. This is obviously imprac- tical and undesirable. Instead, we routinely rely on reasoning that we do not understand—especially in high-stakes situ- ations—and this practice is indispensable to modern life. We defer to the judgments of medical doctors, structural engineers, epidemiologists, meteorologists, and computer scientists on a daily basis, and we do so precisely because we know we do not know what qualifies as good evidence or good reasoning in these highly specialized fields.

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Just as human expertise is most useful in areas where sound judgments require extended and complex training in specialized fields (making the required reasoning opaque to most), AI is most useful in areas where its speed and capac- ity for data processing greatly surpasses human abilities— the same factors that make certain AI technology opaque. And just as the judgment of experts is most valuable in high-stakes situations, the maximal benefit we can derive from AI will be in its application to areas that are central to human welfare (areas such as health, agriculture, climate, and public safety). The power of AI is a double-edged sword. Its extraordinary speed and unconventional data-processing methods are the same factors that can make the most power- ful AI opaque to its users and stakeholders, creating ethical concerns regarding whether it ought to be used in the very areas in which it could potentially provide the most ben- efit. The more knowledge we are ethically required to have regarding how AI technology works when it operates in a particular domain, the less likely it is that we will be ethi- cally permitted to use AI in that domain.

3 Opacity and the problem of algorithmic bias

The call for transparency in AI aims at safeguarding and improving human welfare—in particular, by protecting vulnerable groups who are most often harmed by opaque AI technology and marginalized in AI development. This goal is and should be a top priority in AI regulation. The speed and processing power of AI not only comes at an epis- temic cost; as we have learned, our limited epistemic access to certain AI models can bring with it ethical costs as well. In 2016, investigative journalists at ProPublica published an article that exposed apparent racial bias in the popular risk-assessment software COMPAS, used to aid judicial decision-making regarding individuals' risk of recidivism and eligibility for parole. In 2018, Reuters[1] revealed that the AI hiring algorithm in development at Google showed a strong gender bias.

The push to integrate these ADMs into areas such as recidivism risk assessment, loan approval, and hiring prac- tices, has exposed a tension between two worthwhile goals:
(i) increased efficiency in important decision-making pro- cesses and (ii) protecting individuals' rights by ensuring such decisions are based only upon ethically appropriate considerations. This tension can become more problem-atic when the AI technology involved is opaque—when the methods by which the AI arrives at a decision cannot be tracked by the relevant parties, whether AI practitioner or stakeholder.

The most powerful AI models—such as deep learning models and models involving vast parameters—are also the least comprehensible. While the engineers involved in cre- ating ADMs like COMPAS may be aware of the content of the training dataset and the parameters at the time of use, the precise role these play in generating the ADM's output often remains unknown. For very complex models, there may be no one (neither AI practitioner nor stakeholder) who understands the actual relevance of each datum to the ADM's eventual prediction. As Riberio (2016) writes, "… if hundreds or thousands of features significantly contribute to a prediction, it is not reasonable to expect any user to comprehend why the prediction was made, even if individual weights can be inspected". Characteristics on which we gen- erally believe it would be unethical to base such decisions— such as an individual's race or sex— may play a role in gen- erating the ADM's decision without our knowledge. Even when such protected information is explicitly eliminated from the dataset, opaque AI technology may still display incomprehensible discrimination or 'prejudice by proxy.'[2] An ADM may discover a highly efficient method that utilizes a combination of factors (such as zip code and *alma mater*) in such a way that the output is tantamount to a judgment based on race. The more opaque the AI technology, the less certain we can be that it will be adequately unbiased in its assessment.

In response to the problems that can be generated by the use of opaque AI, there has been a general push for increas- ing transparency in AI. Governing bodies, technology watchdog groups, and ethicists have made transparency a priority in AI regulations. The European Commission's 2019 Ethics Guidelines for Trustworthy AI identifies transparency as its fourth out of seven key requirements that AI systems should meet. In January 2020, the White House released its first guidelines for AI regulation which, although they are limited to the private sector and do not mention transparency verbatim, do include "trustworthiness," which is intimately connected to the value of transparency. Similarly, The Future of Life Institute explicitly includes two transparency-related items in their (2017) account of the general Principles of AI.[3]

Corporations such as Google and Microsoft have publicly acknowledged the importance of transparency in AI as

[1] https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G.

[2] See Barocas (2018).

[3] These principles concern *failure transparency* (if an AI system causes harm, it should be possible to ascertain why), and *judicial transparency* (any involvement by an autonomous system in judicial decision-making should provide a satisfactory explanation auditable by a competent human authority).

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well. As Microsoft CEO Satya Nadella stated in 2016, "We want not just intelligent machines but intelligible machines. Not artificial intelligence but symbiotic intelligence… Peo- ple should have an understanding of how the technology sees and analyzes the world." And in the framework for a 'Good AI Society', Floridi et al. (2018) call for enhanced explicability in AI when AI is involved in socially signifi- cant decisions. "Central to this framework is the ability for individuals to obtain a factual, direct, and clear explanation of the decision-making process, especially in the event of unwanted consequences" (p. 702). The consensus that seems to have emerged in response to the opacity problem has been to treat transparency in AI as valuable in and of itself, and that the overall benefit we gain from AI increases as trans- parency increases. That is, we are better off ethically the more transparent we make our AI models.

4 Ethically significant contexts: concerns beyond bias and fairness

Not all uses of opaque AI give rise to ethical concerns. There are many contexts in which the opacity of an AI model is insignificant simply because we consider the consequences of decisions made in those areas to be trivial. Intuitively, if certain activities genuinely qualify as "for entertainment purposes only," such a context would be trivial, or at least not ethically significant. In the most general terms, for a con- text to be ethically significant the consequences of actions or decisions in that context must at minimum carry a risk of harm (where harm is very broadly construed).[4]

Robbins (2019) is skeptical of the call for transparency in AI, and suggests that while the use of opaque AI is ethically permissible in trivial contexts and certain non-trivial contexts (which he groups together as 'neutral contexts'), it should not be allowed to operate in what he labels 'morally sensitive contexts'.

Robbins intends this division between morally sensitive contexts and 'neutral contexts' to largely map onto the dis- tinction between contexts in which we intuitively feel com- fortable with the use of opaque AI and contexts in which this opacity seems potentially problematic. Commonly iden- tified ethically problematic contexts of use are those such as judicial sentencing (Berk et al. 2016; Barry-Jester et al. 2015), predictive policing (Ahmed 2018; Ensign et al. 2017; Joh 2017; O'Neil 2016) and medical diagnosis (de Bruijne 2016; Dhar and Ranganathan 2015; Erickson et al. 2017). He writes,

> One reason that using inexplicable decisions in mor- ally sensitive contexts like the ones listed above is wrong is that we must ensure that the decisions are not based on inappropriate considerations… Combine this fact with using ML algorithms for decisions that have moral significance (i.e. decisions which could result in harm- broadly construed to include rights violations) and we have an ethically problematic situation. An algorithm used, for example, to accept or reject your loan request will significantly affect you. A rejection could cause you and your partner significant distress and change the course of your life. (Robbins, 2019, p. 498)

Robbins's analysis seems to suggest that there are two features of a context which together make it a morally sensi- tive context. One concerns fairness. The other is magnitude of impact, or whether it is a "high-stakes" context. Regard- ing fairness, there is wide consensus that certain personal characteristics are ethically protected characteristics; these characteristics ought not be taken into account in high-stakes contexts—when the outcome of the decision can have a great impact on one's welfare. Loan approval decisions, hiring decisions, recidivism risk and suitability for parole all seem to be areas in which we need to pay special attention to how judgments are made because there are fair and unfair proce- dures for making these judgments.

Given that there are clear cases in which we do and should value fairness over efficiency, and that it seems reasonable to interpret being treated unfairly as a kind of harm, contexts in which judgments might be made unfairly should be considered a type of high-stakes context with a significant risk of harm. If so, we can incorporate consid- erations of fair treatment in a general account of contexts in which there is significant risk of harm. Unfair treatment is one among many potential harms that we risk when we employ opaque AI; I propose that we widen the category of domains in which we might be prohibited from using opaque AI beyond those which fit Robbins's description of "morally sensitive contexts" to include any context in which there is an opportunity to substantially impact the welfare or wellbeing of an individual or group. We can call these "ethically significant" contexts of use. Insofar as actions or decisions made in these areas can have significant impact on our wellbeing, special attention ought to be paid to our methods for arriving at decisions and determining our course of action in these areas. We may be ethically prohibited, for instance, from using opaque AI in hiring decisions because that model may exhibit unfair gender or racial bias, which has a significant impact on the welfare of those applicants. In the same way, we may be prohibited from using opaque

[4] Harm here is broadly construed to include (at minimum) opportunity costs, as well as intangible/unquantifiable harms such as rights violations, insufficient or inaccurate representation, harm to social reputation, and harm to self-esteem.

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AI technology when deciding on actions regarding global food production: because the stability and resilience of the global food chain has a significant impact on human welfare, we may be ethically required to ensure that we have adequate understanding of the tools and processes on which we base those decisions.

The boundaries for what qualifies as an ethically signifi- cant context on my account are wide and somewhat vague, and may cast a wider-than-expected net over contexts that qualify as "ethically significant." I believe the vagueness and breadth of this category accurately reflect the fact that our actual judgements regarding what features of the world qualify as ethically significant are notoriously difficult to codify.[5] While these judgments are sometimes unpredict- able, there are also central cases on which all or nearly all can agree. Additionally, unlike Robbins, I am not suggest- ing a blanket prohibition against the use of opaque AI in all ethically significant contexts. Therefore, identifying which specific cases qualify as ethically significant will not ulti- mately determine whether it is ethical to employ opaque AI in such a case. Rather, identifying a context as ethically significant means that we are required to subject that case to further scrutiny before we can determine whether it is ethical to employ opaque AI.

As indicated above, a more complete account of the costs and benefits of prohibiting the use of opaque AI in certain contexts will consider contexts beyond those in which issues of bias may arise. A more inclusive (but still incomplete) account of ethically significant contexts will include contexts in which there are multiple types of opportunity cost: risk of inappropriately skewed distribution of benefits (increasing inequity) as well as risk of missed opportunity for significant benefit (especially for vulnerable populations). Recogniz- ing these features as relevant to the ethical significance of a situation allows us to treat cases in which opaque AI may be utilized in areas such as climate science, extreme weather event prediction, public health and medicine, [footnote here which says: see London (2019); Vincent (2018)] and global food production as ethically significant contexts. These areas have sometimes been misidentified as areas in which ethi- cal concerns regarding AI opacity do not arise, because it seems obvious that we value efficiency over transparency in such cases.[6] However, granting that we do in fact value efficiency over transparency in these areas does not entail that we cease to value transparency here, and it certainly does not entail that decisions and actions in these areas are ethically neutral or trivial. It would be a mistake to regard areas in which our concern for efficiency wins out over our concern for transparency as areas that are "ethically neutral", as Robbins (2019) seems to do. There are certain domains in which we value efficiency over transparency for *ethical* reasons, and to ignore this would grossly mischaracterize the domain of ethical concern. Rather, the particular ethical concerns we have in such cases are not put in sufficient jeop- ardy by the opacity of AI to justify the missed opportunity to substantially increase human welfare, which is itself a central ethical concern.

5 Transparency as a proxy for trustworthiness (or, If I knew what you know, I would not need to trust you)

An essential step toward answering the question of when, why, and to what extent we value transparency in AI is to identify the goal of increasing transparency. We can then ask whether that goal could be achieved by means other than transparency itself. Many have suggested that one of the main ethical goals[7] in increased AI transparency is related to trust: we value transparency because it serves as a proxy for the trustworthiness of the AI model.

This is similar—but in at least one sense, importantly different—to the claim that, as transparency increases, stake- holders' trust may reasonably increase as well.

Consider the domain of medical diagnostics. There is a widely supported movement for increased transparency in the AI tools that are currently used in making medical diagnoses, and the motivation behind the movement seems to be grounded in the importance of trust within the medi- cal setting and the doctor–patient relationship. Trust and trustworthiness are two distinct but related features of that relationship, and both are essential to a successful expert/ layperson relation. Whether a tool is trustworthy depends on the typical functioning of the tool—the actual over- all predictive accuracy and reliability of the AI diagnostic tool, whether it is sufficiently robust in the face of small changes, and whether its predictions are based on a suffi- ciently broad and representative dataset. Trust, on the other hand, is a relation that holds between doctors and their diag- nostic tools, or between doctors and the patients who rely on them. The presence of trust between doctor and patient increases the likelihood that the doctor will be able to effec- tively treat the patient; ideally, this improves the patient's health-related wellbeing. This trust is appropriate—when it is—in part because society has guidelines in place to ensure

[5] See Skerker, Purves, and Jenkins (2015) on the anti-codifiability problem in robot and machine ethics.

[6] See Robbins (2019) on valuing efficiency *rather than* transparency in certain non-trivial cases.

[7] There are epistemic advantages to increasing transparency in AI models, but for the sake of this paper we are focusing solely on the ethical goals of requiring transparency in AI.

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that a doctor's extensive training results in sound medical judgment, and a well-functioning social system for verifying expertise (such as board certification and licensing).Trust is an essential feature of modern society's successful (when it is successful) division of epistemic labor. It is clearly indis- pensable for a successful doctor–patient relationship, and the same holds for the epistemic and ethical relationships between experts and laypeople in general. Trust is essential in the absence of understanding and explanation (with sufficient understanding and explanation, trust can be unnec- essary). It is often thought that we trust processes that we understand, as Riberio et al. (2016) make explicit here:

> Whether humans are directly using machine learning classifiers as tools, or are deploying models within other products, a vital concern remains: if the users do not trust a model or a prediction, they will not use it. It is important to differentiate between two different (but related) definitions of trust: (1) trusting a predic- tion, i.e. whether a user trusts an individual prediction sufficiently to take some action based on it, and (2) trusting a model, i.e. whether the user trusts a model to behave in reasonable ways if deployed. Both are directly impacted by how much the human understands a model's behaviour, as opposed to seeing it as a black box. (Riberio, 2016, section 1, emphasis mine)

This is a common assumption regarding the relation between trust and understanding, but it ignores the addi- tional function and value of trust and trustworthiness men- tioned above. Either increased trust or increased understand- ing will typically result in an agent's increased willingness to believe a certain decision is accurate or engage with a certain tool. When patients trust their doctors, that trust is not grounded in the patients' understanding of the doctors' evidence or reasoning. This remains opaque. Patients trust their doctors because they know that, in a well-functioning social system which includes institutions dedicated to expert verification, a person would not hold the position of doctor unless they possessed the adequate expertise.

In a society that operates with a successful division of epistemic labor, trust and trustworthiness can replace under- standing as epistemically and ethically sound grounds for belief. Laypeople believe the judgments of specialized experts because they trust those experts—not because they understand their reasoning—and they trust those experts because their social framework includes institutions whose role it is to verify the legitimacy of specialized experts. If the ultimate aim of increased transparency is to establish trustworthiness and build trust where appropriate, there may be other avenues available for pursuing these goals—paths that allow us to benefit from the power of opaque AI technology by verifying its trustworthiness. Transparency itself need not be our goal.

If this is correct, then the options before us are either

(1) accept that the ethical concerns which give us reason to employ opaque AI may outweigh the benefits of transpar- ency, and determine how to best utilize opaque AI given these epistemic limitations, or (2) refuse to employ opaque AI in any ethically significant context on the grounds that the use of an opaque process is ethically impermissible in those contexts.

Given that there are enormous potential benefits that could arise from the proper use of opaque AI in at least some of the commonly identified ethically significant domains— healthcare, climate science, the global food chain, public safety—we would need powerful ethical reasons to sup- port fully eliminating its use in these areas. The success of the expert/layperson division of epistemic labor shows us that many of our ordinary, ethically responsible, and reli- able social practices already implicitly reject (2) above: we routinely employ opaque processes in ethically significant domains. And I will argue that there is no special reason to embrace (2) in the case of AI while rejecting it in the case of human experts. If this is correct, then we are left with option (1), and the ethical question before us is no longer whether we ought to allow opaque AI to operate in any ethically sig- nificant domains but rather what are the most ethical ways of harnessing opaque AI in these domains.

1 The expert/layperson relation—a blueprint for ethical opaque AI

I have suggested that we take our successful social practice of deferring to specialized experts as a guide for develop- ing an epistemically and ethically sound method for utiliz- ing opaque AI. To this end, we will need to examine when (i.e., under what conditions) it is epistemically and ethically responsible to defer to experts rather than relying on one's own reasoning. We also need to know what features make an individual a genuine expert, how, as a society, we determine that some individual is an expert, and what methods we use for deciding how to act when multiple experts disagree in their decisions. Fortunately, these questions are beginning to receive increased attention both in sociology and philosophy, under the general headings of social epistemology and the epistemology of testimony. Goldman 2001; Goldman 2014; Lackey 2016;

In what follows I will make a preliminary case for the claim that the essential features of experts-- the features that make expert opinion trustworthy, and our trust in those individuals' decisions both epistemically and ethically responsible—can be realized in AI as well. For this to be the case, the relevant features of human experts must not be essentially human features. Certainly, human experts have noteworthy features that AI models lack; for instance, we

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typically assume that human experts have a concept of the greater good and a desire to promote it. If such traits play an indispensable role in generating the trust and trustworthiness on which the expert/layperson relation depends, this relation will not be a viable model for the ethical use of opaque AI. As I hope to show below, the trust that exists in the expert/ layperson relation is not fundamentally based on faith in the moral goodness of the expert but rather on the nature of expertise and the existence of institutions that serve to verify these experts. If these features are not uniquely human features, then, insofar as we have ethically acceptable meth- ods of evaluating when we ought to defer to human experts in high-stakes contexts, we have a potential framework for determining when it is ethically appropriate to defer to the decisions generated by opaque AI technology.

In the mid 1980's, philosopher John Hardwig sparked renewed interest in the social aspects of knowledge-building by drawing attention to the myriad situations in which we are better off—rationally speaking—deferring to someone else's judgment on a particular matter rather than attempting to reason through that matter ourselves. These are situations in which the matter at hand concerns an area of highly spe- cialized knowledge, and there are highly trained experts who specialize in that area. In such a case, a layperson would be more rationally justified in deferring to the expert's judg- ment than they would in performing their own independ- ent reasoning and standing by the judgment at which they themselves had arrived. That is to say, a layperson has better reasons to believe an expert's judgment is correct than his or her own, even when that judgment conflicts with theirs. Assuming that the layperson is a genuine layperson, and the expert a genuine expert, Hardwig writes,

> If, then, layman B (1) has not performed the inquiry that would provide the evidence for his belief that p, (2) is not competent, and perhaps could not even become competent, to perform that inquiry, (3) is not able to assess the merits of the evidence provided by expert A's inquiry, and (4) may not even be able to understand the evidence and how it supports A's [the expert's] belief that p, can B nonetheless have good reasons to believe that A has good reasons to believe that p? I think he can. If so, should we conclude that B's belief that p is rationally justified? I think we should, acknowledging that B's belief stands on better epistemic ground than other beliefs which we would call simply irrational or nonrational. (1985, p.339)

Following Hardwig, we can say that in order for laypeo- ple to be justified in deferring to the (opaque) reasoning of experts—rather than being rationally required to perform their own (transparent) reasoning--there are (at least) three criteria that must be met[R1].

1. The laypeople have not, themselves, performed the rea- soning that is being left to the expert.
2. The laypeople are not capable of performing the rea- soning that is being left to the expert (for any of several possible reasons, to be discussed below).
3. The laypeople cannot themselves 'assess the merits of the evidence' nor understand how the evidence supports the expert's decision. (This combines 3 and 4 in Hard- wig's criteria, above).

6.1 Ruling in-and ruling out-the use of opaque AI

As will soon become apparent, even a framework intended to show where we are permitted to employ opaque AI tech- nology in ethically significant contexts will rule *against* the use of opaque AI in many of the notoriously problematic cases in which those models are already in use. Below, I will adapt Hardwig's (minimal) criteria for deference to experts to apply to AI and briefly discuss the most readily apparent implications of interpreting each criterion in these particular ways.

1. Neither transparent models nor humans have performed the task in question on the scale at which the opaque AI model will be performing that task.

Our general motivation for applying AI to any particu- lar task becomes more clear when we draw attention to the scale of the task; additionally, explicitly specifying the scale of the task is essential to properly characterizing the task itself. In broad terms, many of the same types of tasks that AI models are designed to perform—reviewing loan appli- cations, evaluating job candidates, deciding how to deploy police resources, predicting effects of climate and weather events on food production—have all previously been per- formed by human reasoners. But the size of the problems to which we might apply the tools of AI, and the scale on which we intend for these tasks to now be performed, is unprec- edented. These tasks may require more labor-hours than we can reasonably expect from human beings, especially when the tasks are time-sensitive.

That said, if this first criterion must be met for any ethi- cally responsible application of opaque AI in an ethically significant context, then many instances in which opaque AI is already being deployed may not satisfy the criteria necessary for the ethical use of opaque AI. (More will be said about this when we discuss guideline (B) in the follow- ing section.)

2. Transparent models are not practically capable of per- forming the task that the opaque AI model is intended to perform.

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Whether this criterion is met will in part depend on the state of AI technology and the actual skillsets of AI research- ers at the time the decision is being made. Rudin (2019) points to this aspect of the problem when she writes,

> Black box models seem to uncover 'hidden patterns'. The fact that many scientists have difficulty construct- ing interpretable models may be fueling the belief that black boxes have the ability to uncover subtle hidden patterns in the data about which the user was not pre- viously aware. A transparent model may be able to uncover these same patterns. If the pattern in the data was important enough that a black box model could leverage it to obtain better predictions, an interpretable model might also locate the same pattern and use it. Again, this depends on the ML researcher's abil- ity to create accurate yet interpretable models. The researcher needs to create a model that has the capa- bility of uncovering the types of pattern that the user would find interpretable, but also the model needs to be flexible enough to fit the data accurately. This, and the optimization challenges discussed above, are where the difficulty lies with constructing interpretable mod- els. (2019, p. 201)

If equally proficient transparent models[8] already exist or could realistically be developed within the requisite timeframe (where 'equally proficient' takes into account the *speed* required to perform the task effectively as well as the scale of the task), the additional value conferred by their transparency may make them ethically preferable to an opaque model. Though Rudin is optimistic regarding the potential of transparent (in this case, interpretable) models to perform as well as opaque models, this is by no means guar- anteed. As she acknowledges, "This problem is compounded by the fact that researchers are now trained in deep learning, but not in interpretable ML..." and "It could be possible that there are application domains where a complete black box is required for a high stakes decision," though she notes that, "As of yet, I have not encountered such an application" (2019, p. 207).

[8] While "opaque" has a standard meaning in the literature on this topic, "transparent" has several common meanings when used in the context of AI models. A satisfactorily transparent AI model might be an interpretable model, or an explicable model, or it may be compre- hensible to the relevant practitioner or stakeholder, etc. A thorough account of how "transparency" has been interpreted in the literature on AI regulations is beyond the scope of this discussion, but see Chen 2018; Li et al. 2018; Lipton 2016; Miller 2017; Mittelstadt et al. 2019; Molnar 2019; Riberio 2016; Rudin 2019; Zerilli 2002;

3. e are unable to satisfactorily explain the AI model within a reasonable amount of time given the urgency of the task in question.

An explanation of an AI model would allow us to "assess the merits" of the evidence on which the model is basing its decision and "understand... how [the evidence] supports" that decision. The third criterion roughly specifies that in order for us to sacrifice transparency for the benefits gained by employing opaque AI in a particular ethically significant context, that opacity must be a result of our genuine inabil- ity to explain the operations of the AI model, rather than an unwillingness to deploy sufficient resources to the task. (Note that this issue will only arise when there is a question of irresponsibly employing opaque AI—the context itself must be ethically significant for ethical concerns to compete with the value of the efficiency or accuracy gained by utiliz- ing opaque AI models.)

In addition to this cursory description of when it would be reasonable for a layperson to defer to the judgment of an expert, Hardwig also provides a rough approximation of the personal features that make an individual an expert. Briefly, an expert must have engaged in "inquiry that has been sus- tained, prolonged, and systematic" (1985, p. 338). Though we would need to determine what features of an AI model would make its "inquiry" into a specific domain suitably "sustained, prolonged, and systematic," this criterion seems to pose no special difficulty for AI. And given that these models fundamentally function by discovering and attuning themselves to patterns in data, such data-processing opera- tions should satisfy all relevant features of an "inquiry."

6.2 The social institutions/practices underwriting our successful deference to experts (and how they might be replicated in the case of AI)

So far I have proposed a preliminary set of criteria that would need to be met in order for an individual—or an AI model—to qualify as an expert, as well as conditions under which may it be epistemically and ethically responsible to defer to the judgments of a human or artificial "expert". In this section, we will consider preliminary ideas regarding how we might determine whether some opaque AI model should be considered an expert in this sense. An opaque model may possess the requisite features for "expertise" in a certain area, but the opacity of that model will make it challenging for us to know whether the model has satisfied the appropriate criteria. In addition, I will make preliminary suggestions for how we might deal with morally weighty cases in which (just as with human experts) multiple opaque AI models disagree in their predictions or decisions.

In the familiar cases of human experts, the answers to both of these questions rely, in part, on the existence of

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a larger network of experts in addition to the individual (potential) expert in question. In areas of technical speciali- zation, (academic research, professions such as journalism and law, etc.) we commonly find established institutions and professional organizations that grant degrees, credentials, or otherwise certify that the individual in question does in fact qualify as an expert. These organizations are typically com- posed of individuals who themselves possess certain types of relevant expertise. When cases arise in which a purported 'expert' fails to meet the standards set by the certifying bod- ies in their fields, we rely on these institutions to revoke that individual's credentials. Lawyers can be disbarred, doctors can lose their license to practice medicine, journalists can lose their press credentials, and so on. Ideally, this process serves to inform the public that these individuals are not, in fact, genuine experts in their supposed fields. These institu- tions allow laypeople to know which individuals are experts in which fields, and responsibly defer to their judgments, even though exactly what makes that individual an expert in that field is beyond the understanding of the layperson.

The presence of multiple experts within a single field is not only essential to our ability to know which individuals are experts (since we, as laypeople, cannot evaluate their expertise for ourselves); the fact that large numbers of inde- pendent experts regularly converge in their opinions give us an imperfect but reliable indication that these judgments are correct, as well as a means of determining how to act when experts disagree. If a significant majority of genuine experts converge in their opinion on a particular issue, and a small number of experts disagree, it will be reasonable for the layperson to accept the opinion of the majority.

Adapting our methods for certifying experts and handling expert disagreements such that we can apply them to opaque AI presents more of a challenge than adapting the criteria for expertise itself or for responsibly deferring to experts. The relationship between laypeople and experts in modern soci- ety has a long history, and the trustworthiness of these cre- dentialing institutions is born out only by society's repeated knowledge-building success over time. Our engagement with opaque AI technology has both a short and checkered past. We do not have the convenience of a lengthy history—on a human timescale—to indicate which methods for certifying the expert-status of an opaque AI model will prove to be trustworthy, and which methods are likely to fail.

Because of the importance that time plays in revealing the reliability of expert decisions, of our method for veri- fying individuals as genuine experts, and of our division of epistemic labor in general, whatever way in which we choose to adapt this feature to create an analogous method for revealing the trustworthiness of any opaque AI technol- ogy will be highly speculative. There are no obvious candi- dates for artificial analogs of the passage of time. With that in mind, one possible option would be to treat the notion of an epoch in artificial neural networks as a stand-in for the ordinary passage of time. Rather than thinking of the history of AI models on a human timescale, it may be more appropriate to frame the notion of "an adequate length of time" on which to judge the reliability of an AI model to reflect an AI timescale. So whereas ANNs and other deep learning models may have emerged 10 years ago on a human timescale, a massive number of epochs for those models has passed within this span. (Determining the optimal number of epochs for training a neural network is currently considered something of an art in machine learning.)

There are a growing number of organizations dedicated to developing something akin to a "credentialing processes" for AI. The Institute of Electrical and Electronics Engineers (IEEE) continuously updates its standards for the devel- opment and use of AI. The International Organization for Standardization (ISO) and The International Electrotech- nical Commission (IEC) both work to develop standards that aim to make AI more "resilient, reliable, accurate, and secure". And the European Commission's 2021 proposal for Regulation on Artificial Intelligence includes a legal frame- work by which to judge the risk of AI. The UK Institute for Ethical AI and Machine Learning, the Global Partnership on AI (GPAI), and the OECD AI Policy Observatory all support projects and policy aimed at increasing trustworthiness in AI. What form a successful credentialing process will even- tually take, and to what extent these certification systems are already in place, is a question to be addressed elsewhere. But if we are interested in developing an approval process that could certify certain opaque AI technology and approve its use in particular contexts while allowing the technology to remain opaque, we might make progress on this issue by continuing research into the relevant features of familiar and successful practices of certifying human experts.

The final feature of the expert-layperson relationship that we will address here—our methods for dealing with cases of expert disagreement—is simple to adapt in theory (though perhaps less so in practice). Our successful division of epis- temic labor crucially depends on the existence of multiple independently trained experts in a single field, addressing the same issue and converging on the same opinion through a variety of independent methods. At the present moment, it is unclear whether there exists a sufficient number—and variety—of AI models that could perform the same ethically significant task (whatever this task may be) to deal with disa- greement in an analogous way. But there may be no better way to establish the requisite level of trustworthiness[9] [1] of an opaque AI model than developing multiple, independent,

[9] to whatever extent is required such that it would be ethically responsible to utilize that opaque technology in the particular ethically significant context in question.

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opaque models, operating with distinct architecture and trained on distinct (but appropriately relevant) data sets, and finding that they converge on the same decision. Given that opaque AI will be an ever-present ethical issue, developing multiple models to perform the same ethically significant task may be well worth the investment.

2 Preliminary guidelines for the ethical use of opaque AI

Given that I claim it may be ethically permissible (perhaps required) to use opaque AI technology in certain ethically significant contexts, this section provides a plausible deci- sion procedure for evaluating whether a particular context is one in which we could ethically employ opaque AI. I sug- gest three general questions that should be addressed in the process of making such a decision.

(A) Is the context in question an ethically significant con- text?

(B) Could the task at issue be performed equally well by a transparent process?

(C) Are the benefits of successfully performing this task greater than both (i) the cost of potentially failing at this task (whatever constitutes "failure" in this case) and (ii) the cost of not performing this task at all?

(A) Is the context in question an ethically significant con- text? The process of evaluation begins with question (A): Is the context in question an ethically significant context? If we can be reasonably certain that the answer to (A) is "no," then the ethical concerns surrounding the use of opaque AI do not arise in this situation, and we are at liberty to use opaque AI for the task at issue. Note that the triviality or ethical significance of a context will most often be decided accord- ing to a broad and diverse set of standards, some of which may involve apparently objective and quantifiable measures (for example, the potential consequences of utilizing some proposed AI technology in the global food supply chain) and some of which may involve standards that will vary relative to a cultural or social context (the impact of utilizing some proposed AI on the representation of a particular socially marginalized or vulnerable group). Note also that the ethical significance of a context will be a matter of degree, depend- ing on the gravity of the particular situation(s) involved. If the answer to (A) is "yes," then we need to address question (B). Could the task at issue be performed equally well by a transparent process (whether human or AI)? This question will be familiar from the criteria for rationally deferring to experts in general. The additional benefits that arise from transparency in how decisions are made in all ethically sig- nificant contexts may outweigh whatever benefits the opaque AI may provide. Here, it is important to note that "performing a task equally as well" will include—at minimum— issues of equity and fairness in addition to efficiency and accuracy. As noted in Sect. 4 3, we cannot entirely ignore the harms of opportunity costs for the sake of eliminating bias, especially when those costs are borne by marginalized and vulnerable populations. To permit the use of opaque AI in an ethically significant context, the answer to question
(A) must be yes, and the answer to question (B) must be no. If so, then it may be ethically permissible to utilize opaque AI, subject to further consideration, such as those raised in question (C). Are the benefits of successfully performing this task greater than both (i) the cost of potentially failing at this task (whatever constitutes "failure" in this case) and
(ii) the cost of not performing this task at all? If there are ethically significant cases in which all three bars are met, then there are non-trivial cases in which we would be per- mitted—perhaps required—to utilize opaque AI. And given that meeting all three bars requires that the opaque model in question be reliable and trustworthy, we will need a frame- work for evaluating the reliability and trustworthiness of opaque AI technology. I hope to have made a preliminary case for looking to our successful social practice of deferring to experts in ethically significant domains for a blueprint of how to responsibly employ opaque AI in such a case.

3 Conclusion

I acknowledge that, even as guidelines go, those given above are considerably vague. I view this vagueness as appropri- ate, and—practically speaking—ineliminable. Here, we are concerned with developing rules for ethical action in the use of AI, and as Aristotle said, we should only look for preci- sion in each class of things just so far as the nature of the subject admits. Any rule, no matter how precise, requires interpretation when applied to a particular case. And when the interpretation of those rules involves disentangling and weighing competing moral values, it is the process of inter- pretation itself—and not the rule—that will be doing the lion's share of the work. So I would suggest that insofar as these guidelines are vague, their vagueness is appropri- ate to the subject at hand. Deciding whether a task could be performed equally well by some satisfactorily transparent (human or algorithmic) decision-making process will involve weighing competing values, and the relative strength of those competing values will depend on the ethical inclina- tions of the individuals performing the evaluation. There is no standard, universally applicable measure for assigning weights to these values; each case will need to be evalu- ated individually, and an argument will need to be made for weighting any of these values more strongly than the others. The same is true for deciding whether the benefits of success

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are worth the potential costs of failure. Human judgment cannot be entirely removed from decision-making in ethi- cally significant domains, no matter how trustworthy the AI technology involved. At minimum, humans must still be in-the-loop to (1) make case-specific value-judgments, and

(2) make cost/benefit assessments in cases where the costs and benefits are not fully commensurable. And given that we are discussing opaque AI technology, humans will need to be in-the-loop to monitor for potential instances of biased outcomes. The threat of bias will remain, whether or not the cost of that potential bias is outweighed by the potential benefits of a successful outcome.

These guidelines are not intended to serve as a complete checklist for the ethical use of opaque AI. They merely offer one plausible set of rules for evaluating whether some situ- ation is an instance in which we should consider, or refuse, to employ certain opaque AI technology. If we decide we should, we might then look to the blueprint provided by the expert/layperson division of epistemic labor to see how to do so well. In addition, the overview of the expert/layper- son relation given above is not intended to fully capture the robust and complex features of this social epistemic practice. Whether this overview accurately represents the fundamen- tal features of this relationship is separate from the ques- tion of whether the expert/layperson relation itself—and the institutions that support it—can provide us with a general framework for developing an ethical approach to harnessing the power of opaque AI, as I believe it can.

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