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The Problem of Epistemic Injustice and Multi-Agent Model of Epistemic Diversity**

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Abstract: This article examines epistemic injustice as a fundamental epistemological problem that undermines the possibility of obtaining reliable and complete knowledge. It explores various forms of epistemic injustice — including testimonial, hermeneutical, situational, inverted, and mutual — demonstrating how these phenomena manifest in medical contexts and beyond. The paper presents a multi-agent computational model implemented in NetLogo that simulates medical decision-making through Bayesian epistemology, involving four types of epistemic agents: patients, doctors, experts, and managers. The findings support the argument that epistemic diversity is not merely a social justice concern but an epistemological necessity, consistent with veritistic social epistemology (Goldman), perspectival realism (Massimi), and agential realism (Barad). The article concludes that overcoming epistemic injustice requires not only ethical correction of individual biases but also a more radical transformation of knowledge institutions to integrate diverse perspectives while maintaining a critical differentiation of epistemic competence.

Keywords: Epistemic Injustice, Epistemic Diversity, Bayesian Epistemology, Multi-Agent Modeling, Veritistic Social Epistemology, Perspectival Realism, Agential Realism, Medical Decision-Making.

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The Concept of Epistemic Injustice and Its Extensions

The concept of epistemic injustice describes situations in which people from different social groups face recurrent obstacles to being recognized as knowers due to systemic biases, power imbalances, or structural exclusions in knowledge production and transmission. This concept was introduced in Miranda Fricker's seminal work, where she sought to describe the various ways in which epistemic exclusion occurs. According to Fricker's research, epistemic injustice does "not prompt thoughts about distributive

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unfairness in respect of epistemic goods such as information or education" (Fricker, 2007: 6); hence, it is not strictly related to the digital or cognitive divide. The term "cognitive divide" generally refers to differences in perception, understanding, or interpretation of complex information among individuals or groups. This process, unlike epistemic injustice, is not directed at the bearer of knowledge; rather, it presupposes gaps in perception on the part of the recipient. It occurs at the moment of recognizing someone as a reliable or unreliable source of knowledge, whose testimony can be taken into consideration or rejected. Epistemic injustice manifests in several ways: people are not recognized as being able to know anything; their knowledge is not recognized as reliable; their ability to know is questioned; or their knowledge is not understood (ibid.).

Fricker outlines two key variants of epistemic injustice: testimonial and hermeneutical injustice. Testimonial injustice is the situation in which a speaker's credibility is unfairly diminished due to prejudiced perceptions of their social identity, such as race or gender: "Testimonial injustice occurs when prejudice causes a hearer to give a deflated level of credibility to a speaker's word" (ibid.: 8). A certain systematic bias arises on the part of the one who assesses the reliability of the judgment: "The basic idea is that a speaker suffers a testimonial injustice just if prejudice on the hearer's part causes him to give the speaker less credibility than he would otherwise have given" (ibid.: 17). From the point of view of epistemic logic, the situation of testimonial injustice appears as an assessment of the degree of reliability of sources a and b by some observer O. Such an observer demonstrates a gradation of epistemic trust as a subjective assessment of the reliability of the source of information. This means that the same proposition, with an equal truth value, can be judged as true or false depending on who utters it, if a and b belong to different social (or other) groups.

Hermeneutical injustice is a state of affairs in which marginalized groups lack access to shared interpretative frameworks that would allow them to articulate their lived experiences: "Hermeneutical injustice occurs at a prior stage, when a gap in collective interpretive resources puts someone at an unfair disadvantage when it comes to making sense of their social experiences" (ibid.: 8). Essentially, what is at stake is that some experiences are not considered important or visible enough to be recognized as worthy of understanding and study. Hermeneutic epistemic injustice is not simply based on the fact that certain subjects are ascribed some inability to act as bearers of articulated knowledge, but on the some impossibility to play by

the hermeneutic rules of the dominant group. Here, we can recall, for example, Foucault's studies, which brought topics such as sexuality, corporeality, and marginalized mental states entered academic discourse. Hence, overcoming hermeneutic injustice serves not only the purpose of giving oppressed subjects the opportunity to declare themselves but also broadens the fields of knowledge. At the same time, contradictions obviously arise that go back to the traditional subject-object dichotomy, in which, in order to become a worthy and significant object of research, it is necessary to alienate one's own experience from oneself. As we will see later, this contradiction will also arise when attempting to solve the problem of epistemic injustice.

The phenomenological approach to the problem of testimony reveals how epistemic injustice manifests itself not only as a theoretical problem but also as a phenomenon that affects the very structure of human experience and interaction. Concerning hermeneutical injustice, it means that witnessing attempts to express "that which cannot enter into language or cannot be said because it is banished, forbidden, and removed from it, but nevertheless touches the very heart of human existence" (Heiden & Marinescu, eds., 2025: 84). This approach points to the necessity of recognizing witnessing as a process of creating a "common world" that includes experiences that initially "have no common measure," thus counteracting epistemic injustice and understanding knowledge as always a shared form of knowing.

Obviously, the concept of epistemic injustice is rooted in Foucault's concept of power-knowledge and intersects with Fuller's social epistemology, feminist epistemology, etc. However, Fricker's concept has a number of distinctive features, which we will examine further through the prism of veritistic social epistemology.

Because of the complexity of this problem, there are several accompanying concepts that have been suggested by other researchers who picked up the idea of epistemic injustice. Building on Fricker's work, K. Dotson offers the concept of *epistemic oppression* — the systemic exclusion of marginalized epistemologies (e. g., indigenous traditions) from dominant knowledge systems. Dotson also emphasizes the interrelation between several phenomena:

> Epistemic oppression, here, refers to epistemic exclusions afforded positions and communities that produce deficiencies in social knowledge. An epistemic exclusion, in this analysis, is an infringement on the epistemic agency of knowers that reduces her or his ability to participate in a given epistemic community. Epistemic agency will concern the ability to utilize persuasively shared epistemic resources within

> a given epistemic community in order to participate in knowledge production and, if required, the revision of those same resources (Dotson, 2012: 25).

Such additional concepts allow us to explicate the complex structure and intrinsic mechanisms of epistemic injustice.

Similarly, N. Berenstain's concept of *epistemic exploitation* highlights how marginalized individuals are unfairly burdened with educating others about their lived realities, framing both neglect and over-extraction as oppressive dynamics. Epistemic exploitation "occurs when privileged persons compel marginalized persons to produce an education or explanation about the nature of the oppression they face. Epistemic exploitation is a variety of epistemic oppression marked by unrecognized, uncompensated, emotionally taxing, coerced epistemic labor" (Berenstain, 2016: 570). We can argue that this concept is highly controversial in the epistemological context because it significantly increases the imbalance between knowledge and social justice in favor of the latter and also introduces into the epistemological plane only one area of knowledge, namely knowledge related to the experience of discrimination. Within such a framework, the whole scheme begins to look like this: knowledge about personal experience is always alienated; this alienated knowledge is used by privileged groups; that is, there are no and cannot be any purely epistemic goals for the integration of a certain experience into the epistemic context.

J. Medina suggested a rather radical concept of *hermeneutical death*, which represents the most extreme form of hermeneutical injustice. It occurs when "subjects are not simply mistreated as intelligible communicators, but prevented from developing and exercising a voice, that is, prevented from participating in meaning-making and meaning-sharing practices" (Medina, 2017: 41). This radical form of injustice involves the loss or severe curtailment of one's voice, the destruction of interpretative capacities, and the annihilation of one's status as a participant in meaning-making communities. Medina gives a historical example:

> A good illustration of measures that contribute to hermeneutical annihilation can be found in slave traders' practice of separating African slaves who spoke the same language to maximize communicative isolation and in US slaveholders' practice of punishing slaves caught speaking African languages. This illustrates the deliberate strategy of hermeneutic destruction: slave traders separated African slaves who spoke the same language in order to maximize their communicative isolation (ibid.: 47).

Much of the research on epistemic injustice focuses on how it manifests itself in areas where personal experience is important, such as medicine and health care. Patients frequently experience testimonial injustice when healthcare providers discount their testimonies due to stereotypes about illness affecting cognitive reliability and emotional stability:

> *Agential testimonial injustice* is generated by culturally prevalent stereotypes of ill persons, the majority of which build in negative accounts of their epistemic abilities. The ill are often stereotyped as, inter alia, cognitively impaired, overwrought, unable to "think straight," existentially unstable, anxious, morbid, and so on, due either to their condition or their psychological response to it. Such attributions are liable to prejudice how others perceive and evaluate their epistemic abilities (Carel & Kidd, 2017: 338).

Healthcare systems create knowledge asymmetries that privilege medical training over patient experience, effectively limiting epistemic authority to practitioners. On the other side, women medical students report having their knowledge and experiences discredited based on their gender (Blalock & Leal, 2023).

The literature describing epistemic injustice focuses heavily on medical applications and often fails to extend to broader natural science contexts. But it is reasonable to suggest that epistemic injustice also exists in other scientific fields. For example, scientists from non-European countries may face prejudices regarding their research results because they allegedly lack the relevant competence. At the same time, specific ways of interpreting reality inherent in non-European cultures, which could introduce a heuristic component into scientific research, may be ignored by local scientists themselves because they do not have the hermeneutic resources to integrate this component into their scientific work.

Several additional concepts of epistemic injustice reinforce each other, creating a comprehensive picture of this complex problem. Together they show that epistemic injustice is not just an ethical problem for individuals and their biases, but a deeply rooted political problem that requires not only virtues but also a radical transformation of knowledge institutions. Institutional restructuring should dismantle the epistemic hierarchies embedded in science, education, media, legal systems, healthcare, and other domains. But without understanding the diverse mechanisms through which epistemic injustice is reproduced, without studying how the systems of inclusion and exclusion work in the field of knowledge production, how in principle it is

possible to solve the problem not only at the social but also at the epistemological level, all these postulates will remain only declarative statements.

ADDITIONAL KINDS OF EPISTEMIC INJUSTICE

Let's turn to the case of epistemic injustice described in the article "Incline and Admonish: Epistemic Injustice and Counter-Expertise" (Shevchenko, 2020). In autumn 2019, several users in an online community reported complaints about the smell of sewage in Saransk, a city in Russia. A user representing one of the regional government agencies responded that the human olfactory threshold might be lower than the maximum permissible concentration of substances. According to the comments, community members interpreted this statement as implying that their experience was not credible. The key issue here was not that people doubted the accuracy of the measuring instruments, but rather that their personal, phenomenological experience was being dismissed. The government representative was effectively denying the validity of citizens' sensory experiences by prioritizing instrumental data over their lived reality.

The author compares this situation to telling a patient with chronic pain to stop seeking medical help simply because an MRI hasn't detected any pathologies. This case illustrates what the author identifies as a radical form of epistemic injustice — the "derivatization" of another person's experience, where someone's phenomenal experience is treated merely as a derivative of measured parameters rather than as a legitimate source of knowledge in itself.

What's interesting for us in this situation? In such a situation, people of different identities (for example, men and women) suffer because of common circumstances, and none of them possess critical privilege to be heard. Here, we can see that there is a distrust of the evidence and sensory experience of people from different social groups, placed, however, in shared situation of epistemic injustice. It is obvious that distrust was expressed not only toward to representatives of a more deprived stable group (for example, women) but also toward men. This suggests that in addition to stable patterns of epistemic injustice based on stable identity, there may also be a form of epistemic injustice that can be designated as *situational epistemic injustice*. It arises when an agent situationally finds themselves in a position in which he or she is not given epistemic trust, although in another situation it might well be granted. This approach to the issue of epistemic injustice resembles the concept of T. J. Spiegel (Spiegel, 2022), who believes that the class dimension should be at the center of the study of epistemic injustice instead

of race or gender identity. But still, the concept of class is more stable than that of situational epistemic injustice.

Of course, within situational epistemic injustice, we can also observe its more stable forms, which arise when representatives of deprived identities find themselves in a situation of double mistrust. In addition, there is a special kind of testimonial injustice, which is called *intragroup testimonial injustice* (Tobi, 2023). This kind of testimonial injustice occurs when members of the same marginalized community dismiss or devalue each other's credibility due to internalized biases or hierarchical divisions within subgroups. By fracturing trust from within, it perpetuates epistemic vulnerability even among those ostensibly united against systemic exclusion.

Finally, we can imagine the most controversial situation of epistemic injustice. Let us imagine that we have an actor whose judgments are distrusted not because of their marginalized, but, on the contrary, because of their privileged social position. It is assumed that such an actor is automatically biased towards, for example, representatives of a marginalized group and the knowledge, experience, etc., they exhibit. At the same time, this actor may indeed be biased, or, on the contrary, may reflect on their prejudices, for instance through an act of phenomenological reduction, and be completely unbiased. Let us call this state of affairs *inverted epistemic injustice*. This situation is connected with the general tendency to distrust expert institutions, since, on the one hand, critical approaches really reveal the bias of experts, while on the other hand, the inconsistency of expert assessments demonstrates the complexity of knowledge production practices and the problems associated with it. The most illustrative example of this situation was the Covid-19 pandemic, which clearly demonstrated many epistemic difficulties.

And here we reach a state where there is a situation of mistrust towards experts simply because they are experts. On the one hand, it is implied that an expert always occupies a privileged position based on his or her identity. But what if the expert is, for example, not a white, middle-aged heterosexual man, but a Black woman? On the other hand, expertise is questioned because there are examples of blatant political bias among experts. Mistrust generated by individual cases of bias seems to cast doubt on any institutions related to the search for knowledge, problem solving, etc. "Epistemic injustice is not one-sided, with a division between victims and the guilty, but general and mutual" (Tishchenko, 2020: 43). Thus, we can see another type of epistemic injustice, *mutual epistemic injustice*, when

the discrepancy in social and expert positions causes the actors to mistrust each other.

Thus, we have a complex and ambiguous structure of epistemic injustice, based on the diversity of epistemic actors and forms of their interrelations. Some of them will suffer more from testimonial injustice, others from hermeneutic injustice. We ultimately arrive at the conclusion that epistemic injustice can have not only a stable (based on stable identities) but also a flexible, situational character, and also lead to situations when the very possibility of expert knowledge is questioned. Therefore, we can postulate the necessity that models for overcoming epistemic injustice cannot assume simple solutions associated, for example, with a straightforward distributive allocation of epistemic trust.

THE WAYS OF SOLVING THE EPISTEMIC INJUSTICE PROBLEM

Naturally, most authors who study the problem of epistemic injustice offer various solutions to this problem. And these solutions depend heavily on which component worries the researcher more: social injustice in relation to the knowledge-producing actor or the improvement of epistemic practices.

One of the leading approaches builds on M. Fricker's already-familiar work, which proposes the development of personal intellectual virtues as a strategy for overcoming epistemic injustice (Fricker, 2007). Fricker argues that testimonial injustice can be addressed by cultivating epistemic virtues such as humility, integrity, and fairness in listeners. This requires people to actively consider the biases that distort their assessment of a speaker's testimony. For example, healthcare professionals could be trained to recognize how their stereotypes can lead to the dismissal of certain groups of patients' reports of pain, thereby addressing the trust deficit in healthcare. However, this solution is insufficient because of the deep and systemic nature of epistemic injustice.

Complementing this individual-focused approach, J. Medina has developed strategies for expanding hermeneutical resources to address hermeneutical injustice (Medina, 2017). Medina emphasizes the importance of creating inclusive interpretive frameworks that empower marginalized groups to articulate their experiences. His concept of "resistant imaginations" describes collective efforts to challenge systemic gaps in understanding, such as recognizing systemic racism. In extreme cases, Medina advocates for more radical approaches, including epistemic disobedience (using tactics like strategic lying when existing language fails to capture experiences of oppression)

and epistemic insurrection (revolting against oppressive expressive norms through counter-discourses).

Some researchers prefer to talk not about solving the problem of epistemic injustice in general but about overcoming it in certain areas, primarily in the field of health care (which is not surprising, since this is where it manifests itself most clearly). For instance, Carel and Kidd have documented how healthcare systems can address testimonial injustice through targeted training programs that help medical professionals recognize the biases that arise in assessing patient testimony (Carel & Kidd, 2017). Similarly, Sullivan has examined how legal systems can combat epistemic injustice by diversifying juries and judges, improving education on credibility biases, and ensuring that marginalized testimonies are not dismissed due to gendered stereotypes (Sullivan, 2017).

As for the question of how epistemic injustice in the process of knowledge production can be overcome, several solutions are also proposed here. First, it is about paying special attention to ensuring the visibility of non-mainstream epistemic communities. These are epistemological communities formed by marginalized groups, such as Indigenous knowledge communities, that generate counter-narratives and are often forced to resist hermeneutical marginalization. For example, African American communities creating alternative historical narratives to counter dominant Eurocentric histories exemplify this approach. A similar situation may arise in other regions where processes of the displacement of local cultures by imperial cultures have taken place.

Other studies highlight the need to work on building epistemic trust. This implies another institutional solution, according to which strengthening epistemic trust requires democratizing knowledge production and ensuring institutional recognition of marginalized epistemologies (Anderson, 2012). This might involve reforming scientific peer-review processes to include Indigenous ecological knowledge, thereby rectifying credibility imbalances, or similar measures. Concerning academic science, it is also necessary to ensure fair crediting marginalized scholars' work and to avoid their instrumentalization, such as citing Indigenous researchers as primary authors in environmental studies rather than merely as local informants (Berenstain, 2016).

From the point of view of an intersectional approach, epistemic injustice cannot be addressed without considering how race, gender, and class intersect and reinforce each other's effects (Dotson, 2014). Ignoring class or

treating identity categories as additive rather than co-constitutive perpetuates hermeneutical injustice, leaving entire dimensions of lived experience unarticulated and structurally invisible within dominant knowledge systems. Therefore, a truly intersectional epistemology demands not only pluralistic recognition, but also a radical restructuring of epistemic institutions to center the complex, overlapping realities of multiply marginalized knowers.

A less radical but also effective approach is counter-expertise, which refers to grassroots efforts by non-professional actors — such as activists, patients, or local communities — to challenge, reinterpret, or co-create scientific knowledge. Counter-experts engage with scientific facts through three primary modes: adopting existing facts to demand accountability (such as communities citing radiation studies to pressure regulators); unpacking "black boxes" by exposing the networks behind scientific claims; and initiating new knowledge creation when official science ignores emerging issues (Filatova, 2020).

These approaches collectively represent a multifaceted strategy for addressing epistemic injustice. They range from individual virtue cultivation to institutional reforms, from community-based resistance to epistemic solidarity, and from educational interventions to radical epistemic insurrections. Each pathway recognizes that overcoming epistemic injustice requires not only correcting individual prejudices but also transforming the structural conditions that produce and perpetuate credibility deficits and hermeneutical marginalization. By implementing these strategies in complementary ways, societies can move toward more just epistemic practices that value diverse ways of knowing and ensure that all voices receive the credibility they deserve.

Here, we can distinguish at least three types of strategies for overcoming epistemic injustice. Firstly, there is the most radical decolonial approach, which argues that epistemic injustice is implemented in the structure of standards of Eurocentric culture and science. Here, a rather radical option — rejecting these standards and even replacing European (originally colonial) science with indigenous and local knowledge systems — becomes conceivable. The second strategy consists of cultivating individual sensitivity to prejudices within the framework of institutionalized practices. Finally, the third type of strategy is focused on the inclusion of alternative expert opinions and counter-expertise in the system of knowledge production. But if we are not ready to reject the standards of rationality and continue to continue to affirm the effectiveness of science, then which strategy will we choose? And an even more complex and dangerous question: isn't this this type of

epistemic injustice — and can it be called injustice — a practically inevitable component of the processes of knowledge production?

EPISTEMIC INJUSTICE FROM THE POINT OF VERITISTIC SOCIAL EPISTEMOLOGY

Most concepts of epistemic injustice have focused primarily on injustice in the social sense and the epistemic aspect here has seemed more like an auxiliary way of describing another version of power imbalances and oppressive practices. Fricker emphasized this as follows: "there is nothing very distinctively epistemic about it, for it seems largely incidental that the good in question can be characterized as an epistemic good" (Fricker, 2007: 1). But let's try to shift the focus somewhat and approach the topic of epistemic injustice from a more epistemological rather than a social perspective. Moreover, it's possible that a radical rejection of attempts at epistemic interaction between bearers of privileged and marginalized knowledge, out of fear that representatives of the former will engage only and exclusively in the appropriation of someone else's experience for their own purposes, cannot ultimately benefit the deprived groups. By contrast, the adaptation of proven knowledge systems to one's own needs, or even the demand for such an adaptation, seems like a more constructive way of acting. Finally, let us assume that we are pursuing epistemic goals first and foremost, and that achieving justice also depends on achieving them.

In order to interpret the problem of social justice in a more epistemological than social key, we will consider it from the point of view of veritistic social epistemology of A. Goldman. Although the roots of the concept of epistemic injustice clearly go back to non-veritistic social epistemology, we will try to reconsider this situation. Besides, we will use the concept of perspectival realism of M. Massimi and K. Barad's agential realism.

At first glance, Goldman's and Fricker's approaches may seem to be opposites: Goldman aims to maximize truth (veritism) (Goldman, 1999), evaluating social practices by their ability to produce true beliefs, while Fricker focuses on fairness, analyzing how social prejudices and structural inequalities distort our treatment of knowledge holders. Goldman uses the definition of knowledge as justified true belief and, based on this, defines the goal of veritistic social epistemology:

> Veritistic epistemology (whether individual or social) is concerned with the production of knowledge, where knowledge is here understood in the "weak" sense of true belief. More precisely, it is concerned with both knowledge and its contraries:

> error (false belief) and ignorance (the absence of true belief). The main question for veritistic epistemology is: Which practices have a comparatively favorable impact on knowledge as contrasted with error and ignorance? (Goldman, 1999: 5).

In this sense, he softens the strictly realistic interpretation of knowledge. Fricker herself directly criticizes postmodern relativism:

> A crucial attraction of postmodernist philosophical thought was that it placed reason and knowledge firmly in the context of social power... But this turned out to be largely a vain hope, for the extremist bent in so much postmodernist writing led too often to reductionism, and the driving force behind the postmodernist spirit emerged as more a matter of disillusionment with untenable ideals of reason than any real will to bring questions of justice and injustice to bear in reason's entanglements with social power. Suspicion of the category of reason per se and the tendency to reduce it to an operation of power actually pre-empt the very questions one needs to ask about how power is affecting our functioning as rational subjects for it eradicates, or at least obscures, the distinction between what we have a reason to think and what mere relations of power are doing to our thinking (Fricker, 2007: 2).

Although Fricker is a feminist philosopher, her approach differs from the more "non-veritist" forms of feminist philosophy, which are incompatible with Goldman's approach (Pinnick, 2000). She uses feminist critiques of power and stereotypes not to reject objective truth but to defend the right of oppressed groups to engage in a rational search for truth. Although it is perhaps precisely this moderate position that has led her followers to propose more radical options for overcoming epistemic injustice.

It turns out that Fricker's and Goldman's projects are in many ways complementary. Goldman seeks to identify the social mechanisms that lead to truth. Fricker shows that one of the main obstacles to this path is bias and epistemic exclusion. Fighting epistemic injustice is thus not a distraction from the pursuit of truth but a necessary condition for achieving it. When we ignore the knowledge of a patient, a woman scientist, or an indigenous person, we do more than commit a moral error; we deprive ourselves of valuable evidence that could bring us closer to a fuller and more accurate understanding of reality. Goldman's veritist goal of maximizing truth requires the epistemic inclusivity advocated by Fricker. As Coady (Coady, 2010) notes, even if a marginalized group is unfairly denied access to certain knowledge (e. g., professional) and cannot interpret its experience in the relevant categories, it still has unique experiential knowledge. Ignoring such experience is not only a social injustice but also an epistemic error.

To justify the epistemic value of knowledge diversity, we can turn to M. Massimi's concept of perspectival realism (Massimi, 2022). Massimi offers a realistic, but not naive, view of science. She argues that scientific knowledge is produced through "modally stable phenomena"— stable events that manifest themselves in different experimental and theoretical contexts. The key idea is that different perspectives (including local, "profane" knowledge) are like different "windows onto reality," different angles of view on the same phenomenon. Local knowledge (for example, indigenous ecological knowledge) is not "pre-scientific." It represents a unique perspective that can reveal aspects of reality that are inaccessible to more "global" science. Cutting off such knowledge ("epistemic cutting") is not just an injustice; it is an epistemic misery that leads to an incomplete and distorted picture of the world. Integrating these perspectives allows science to better identify "modally stable phenomena" and build more reliable models.

Finally, the agential realism of K. Barad provides an ontological justification for the epistemic value of all forms of experience (Barad, 2005). She introduces the concept of "material-discursive practices" in which knowledge and reality co-emerge: "In fact, agential realism offers an understanding of the nature of material-discursive practices, such as those very practices through which different distinctions get drawn, including those between the 'social' and the 'scientific'" (ibid.: 201). Entities (including the knowing subject) do not exist independently but "intra-act" with each other, producing phenomena. This means that there is no neutral, objective observer. All knowledge is knowledge from a position shaped by specific material-discursive configurations. The experience of a different (not fitting into the mainstream discourse) bodily subject is not a "subjective opinion," but a legitimate form of knowledge generated by a unique configuration. When dominant systems ignore these experiences (committing, in Fricker's words, testimonial or hermeneutic injustice), they are not simply biased; they are committing an ontological error, depriving themselves of access to entire layers of reality that could be materialized through these alternative practices. Barad shows that epistemic justice is not just an ethical imperative, but an epistemological necessity. Without "ontological humility" and the inclusion of marginalized voices, our collective understanding of the world remains fundamentally incomplete and inadequate.

Thus, comparing the positions of Goldman, Fricker, Massimi, and Barad allows us to rethink the problem of epistemic injustice. It is not just a social problem that requires ethical correction of individual biases. It is a profound epistemological problem that undermines the very possibility of obtaining

reliable and complete knowledge. The struggle for epistemic justice is not a departure from the search for truth but an integral part of it. One of the most obvious and at the same time most difficult to implement approaches to solving this problem is the principle of epistemic diversity.

THE PROBLEMS OF EPISTEMIC DIVERSITY

Epistemic diversity is a broad epistemological and practical approach of including different types of epistemic agents in the field of knowledge production. It encompasses differences in how individuals or communities form beliefs, validate knowledge and approach problem-solving (Pinto & Pinto, 2023). This synthesis of perspectives illustrates that epistemic diversity is not merely about inclusion but about fundamentally reshaping how knowledge is produced, validated, and applied across different epistemic agents and communities. This approach is consistent with the principles of perspectival realism, as well as with the principle of diversity and the material foundation of epistemic practices. Moreover, if epistemic diversity is a necessary component of epistemic activity, the question arises of how to relate it to the presence of epistemic inequality, which may also turn out to be one of the components of our epistemic practices.

Epistemic diversity is possible in several interconnected forms (Leonelli, 2022). A primary form is found within disciplinary and epistemic communities, where individuals' affiliations (for instance, engineers, social scientists, or indigenous knowledge holders) shape distinct epistemic standpoints. This diversity can be analyzed across three levels: the individual (personal beliefs), the working (contexts shaped by one's occupation), and the group (shared perspectives forged through collaboration).

Closely tied to this is the critical dimension of linguistic diversity. Language profoundly influences how knowledge is articulated, structured, and validated. Monolingual environments, such as English-dominated academia, can actively suppress epistemic diversity by marginalizing non-dominant languages and the unique conceptual frameworks they carry. Conversely, ensuring linguistic equality and allowing participants to use their preferred language fosters a much richer and more authentic exchange of knowledge.

Another vital form is the diversity of cultural and traditional knowledge systems. Indigenous and local knowledges, for instance, often emphasize relational, experiential, and context-specific understanding, which can contrast sharply with more universalizing scientific paradigms. These differences in cultural practices and values fundamentally shape how knowledge is produced, shared, and deemed credible.

Finally, epistemic diversity is expressed through methodological diversity in research and inquiry. This encompasses the classic variations between quantitative and qualitative approaches, reductionist and holistic frameworks, and empirical versus interpretive paradigms. Underpinning these methodological differences are divergent validation criteria: different epistemologies prioritize different standards for what counts as valid knowledge, whether it is empirical evidence, communal consensus, or spiritual authority.

Epistemic diversity seems like an obvious way to overcome epistemic injustice, but in trying to establish it in theoretical and practical areas we inevitably encounter a number of both epistemological and organizational problems. The first of these problems is the question of the closed nature of epistemic systems, their hermeneutic opacity. The question arises of how to overcome this closed nature, when different epistemic subjects literally speak different languages. A simple solution — asserting the equivalence of epistemic systems while leaving each confined to its own local framework — does not solve the problem of increasing knowledge through diversity. After all, in the ideal case, for example, not only should the epistemic experience of Indigenous cultures be integrated into the structure of scientific research, but the Indigenous cultures themselves should adjust or recalibrate certain ideas under the influence of scientific discourse. At the same time, it is necessary to maintain the difference and disagreement between the ways of obtaining knowledge, otherwise the necessary diversity will not be observed.

Another point is associated with the risk that the epistemic exploitation and alienation of knowledge from the personal experience of its bearer will not disappear. For example, residents of countries with a sufficiently high level of digitalization can constantly voluntarily agree to have their personal digital monitoring data on their health (pulse, number of steps taken, etc.) transferred to specialized campaigns. Moreover, they can take part in specialized surveys on their personal experience, that is, they literally provide evidence of the states they experience, etc. Yet how this data will be used and what kinds of research results will be produced on its basis, remains largely opaque to them (Zuboff, 2019).

One more problem is related to the question of whether the principle of epistemic diversity will not, on the contrary, lead to a situation of inverted epistemic injustice. Distrust of scientific expertise, or the inclusion of epistemic actors in any contexts solely on the basis of the principle of epistemic diversity, may not be justified in all contexts. As some studies show, in some tasks a homogeneous group of experts copes better than a group

observing the principle of diversity, whereas in other context the opposite may well be true.

Finally, is it possible in principle to reach some agreement on the truth of a certain judgment in groups where the positions initially do not converge and all of them have absolutely equal epistemic weight? Should epistemic trust be distributed equally, or is there a need for differentiation based on areas of competence and the degree of trust in epistemic agents. To address this question, let us turn to the possibilities offered by computer modeling of a specific epistemic case.

COMPUTER MODELING IN SOCIAL EPISTEMOLOGY

To build the model of epistemic diversity we will use a multi-agent computer simulation. Multi-agent modeling (or multi-agent system modeling) is a computational modeling approach used to simulate the actions and interactions of multiple autonomous agents (which can represent individuals, groups, organizations, or even abstract entities) within an environment. The primary goal is to understand how the behavior and decisions of these individual agents, often following relatively simple rules, give rise to complex, emergent system-level phenomena, patterns, or outcomes. Multi-agent modeling is becoming a fairly common modeling method in contemporary computer epistemology. NetLogo is one of the most useful programmable environments for modeling complex systems consisting of many actors and changing over time.

Multi-agent modeling is a relevant method of epistemological research, since

> modeling human-machine interactions, as well as the implementation of multi-agent systems, can be improved using philosophical approaches, while philosophical hypotheses about cooperation and collective activity can be tested by implementing them in artificial systems (Misselhorn, 2015: 3).

Multi-agent modeling, as the most noticeable trend in the field of computer epistemology, is most applicable within the framework of the social-epistemological approach. This is due to the fact that social epistemology studies processes that lend themselves well to interpretation by means of multi-agent systems: group beliefs, the dynamics of discussion and agreement, the formation of shared conclusion, or the distribution of confirmation across many actors, etc.

Let us consider how multi-agent modeling is used to study problems related to the topic of epistemic diversity. The first research "Yes, No, Maybe

So: A Veritistic Approach to Echo Chambers Using a Trichotomous Belief Model" (Baumgaertner, 2014) is devoted to the problem of echo chambers effect. This effect is based on the fact that the opinions of actors confirm and reinforce each other in a closed community; such a situation creates a unified internal position on certain issues and does not allow alternative information to enter into the system. As a result, actors become uniform in their abilities to perceive and produce information, which, accordingly, leads to a decrease in intra-group diversity, and this is considered as a negative phenomenon, because it suppresses the diversity of views needed to make good decisions. The study proposes to evaluate an alternative strategy of impartiality, that is, seeking interaction with different people, where agents allow their opinions to be shaped by others.

The study uses agent-based modeling with NetLogo: agents randomly move through space and interact when they encounter each other, updating their beliefs and their embeddedness according to specified rules. The key findings are that the practice of impartiality (random encounters between agents in the model) alone is insufficient to reliably prevent or destroy echo chambers. The ability to mitigate this effect depends on the embeddedness of beliefs, including false ones. Therefore, the lower the embeddedness of agents' beliefs, the greater the likelihood that the echo chamber effect will be destroyed. On the other hand, low embeddedness of the beliefs of some agents (capable of impartiality) indicates that such agents lack a stable position and may subsequently succumb to the influence of agents with more embedded beliefs. Taken together, this demonstrates that the problem of establishing diversity in the practices of acquiring and producing knowledge and information is even more complex than it might initially appear:

> ...sometimes the echo chamber effect may even be desirable under certain conditions. For example, if some agents are "designated" as possessing the truth, then all other agents may have to join them... However, if there are enough "dissenters" around (ordinary agents with sufficiently ingrained attitudes opposite to the designated agents), then they can counteract the effects of the designated agents by meeting each other between meetings with the designated agents. If agents could distinguish between each other and thus control whom they meet, this would provide a way to maintain dissent. But this is precisely what the practice of impartiality is intended to avoid (ibid.: 2562).

L. Hong and S. Page mathematically prove that, under certain conditions, a collective of randomly selected but functionally diverse agents outperforms a group of the best individual performers in their paper "Groups of

Diverse Problem Solvers Can Outperform Groups of High-Ability Problem Solvers" (Hong & Page, 2004). The authors model solvers as agents with unique "perspectives" (ways of conceptualizing the problem) and "heuristics" (solution-finding algorithms). The key finding — that "diversity trumps ability" — is based on the fact that in a large population, the "best" agents, selected based on individual performance, become too similar in their approaches and tend to get stuck in the same local maxima. In contrast, a random group, thanks to a greater diversity of strategies, covers a wider search space and is more likely to find the global optimum. As the authors note, "Their relatively greater ability is more than offset by their lack of problem-solving diversity" (ibid.). Computer experiments confirm this: for example, with parameters $l = 12$ and $k = 3$, a group of 10 random agents achieved a collective score of 94.53% versus 92.56% for the top 10, while the corresponding average diversity was 90.99% versus 70.98%.

This result has profound practical and theoretical implications. The authors emphasize that an individual's value in a team is determined not so much by their absolute ability to solve a problem alone, but by the uniqueness of their approach relative to other team members. They write:

> Thus, even if we were to accept the claim that IQ tests, Scholastic Aptitude Test scores, and college grades predict individual problem-solving ability, they may not be as important in determining a person's potential contribution as a problem solver as they would be measures of how differently that person thinks (ibid.).

The article offers a powerful argument for encouraging functional diversity in organizations, especially in innovative industries, where success depends on the continuous search for new solutions. The authors clearly distinguish between functional diversity (differences in thinking) and identity diversity (race, gender, age), warning that the former does not always correlate with the latter, and that the latter can create communication barriers. In conclusion, they call for the creation of organizational structures that "take advantage of the power of functional diversity" and even suggest encouraging "even greater functional diversity, given its advantages" (ibid.).

In the other research, "Diversity, Ability, and Expertise in Epistemic Communities" (Diversity, Ability, and Expertise..., 2019), the authors show that the success of the results is compared across different "epistemic environments" (landscapes). In particular, on smoother (structured) landscapes, where success on one task predicts success on another, expert groups (highly skilled agents) begin to outperform diverse groups. The authors argue that agents who perform "best" on a single, randomly generated problem should

not be considered true experts. Genuine expertise implies the transferability of skills as the ability to perform well not just on one isolated task, but across a range of related problems within a domain. In the original Hong and Page model, problems are represented as "random landscapes," where the value (or correctness) of a solution at any one point has no correlation with the values at neighboring points. In such an environment, an agent's success on one problem is purely coincidental and offers no predictive power for success on another. The "best" agents in these simulations are therefore not experts; they are merely "lucky" individuals whose specific problem-solving strategies happened to align perfectly with the arbitrary structure of that one particular landscape. To create a more realistic model, the authors introduce a parameter called "smoothness." A "smooth" landscape is one where the value of solutions at nearby points is correlated; in other words, good solutions tend to be clustered together. This mirrors real-world problems, where effective strategies (like "hill-climbing") can be incrementally refined and applied to similar challenges.

We are interested in two aspects of these articles. First, the idea of using an epistemic landscape allows us to model not just some agreement among agents regarding the truth of judgments, but also the search for the best solution to a problem. Second, the demonstration that achieving epistemic diversity is a rather complex solution and requires not just the equality of epistemic agents but also close attention to the situational context.

The potential of computer modeling as a basis for philosophical, including epistemological, research even leads to the conclusion that computer modeling should become the main philosophical method (Mayo-Wilson & Zollman, 2021). It is assumed that computer simulations, primarily multi-agent models that study interactions between actors , should be used as a more accurate alternative to thought experiments. For example, one can imagine how the thought experiment "Trolley Problem" is modeled at the level of a multi-agent model, where agents "make a decision." The authors argue that

> simulations should not displace other philosophical methods. Rather, simulations should be a tool in the philosopher's toolbox that can be used along with thought experiments, careful analysis of arguments, symbolic logic, probabilistic analysis, empirical research, and many other methods. But simulations are particularly useful in several philosophical fields, including social epistemology, social and political philosophy, and philosophy of science (ibid.: 32).

Thus, computer simulations may eventually become a key component of social epistemological research. Another question is whether the accuracy

of simulations is a complete substitute for the imprecise assumptions of thought experiments, or whether both approaches should continue to exist in parallel in epistemological research.

THE AGENT-BASED MODEL OF SPECIFIC EPISTEMIC SITUATION

One of the key questions concerning epistemic diversity: can representatives of different epistemic groups come to some common decision that can be recognized as the best possible decision of some problem? This complex issue forces us to raise a critical question: when we recognize something as rather reliable knowledge, but it is in contradiction with everyday group (or personal) experience and tends to ignore this experience should we reject such knowledge? Or should we think of this knowledge as potentially repressive and consider the epistemic equality of different ways of knowing and different types of "knowledge"? One of the most illustrative examples of such situation is discussion about evidence-based medicine and making decisions about the relevant method of treatment, the effectiveness of a drug, etc., based on some consensus of interested actors.

Evidence-based medicine is a general term for an approach to medicine in which medical practice is based on the results of studies of the efficacy and safety of drugs, treatments, etc., carried out according to the principles of scientific rationality and using relevant scientific methodology. There are a number of research methods that comply with the principles of evidence-based medicine (for example, a placebo-controlled study), but there is no need to dwell on them in detail at this stage. This kind of medicine is rooted in the principles of colonial European science, rejects the everyday peoples experience, and is supported by many (but not all) governments, international organizations, and farm companies, etc.

At the same time, there is widespread rejection of evidence-based medicine among both among medical specialists — who on the one hand must adhere to clinical recommendations, and, on the other hand, rely on their own professional experience — and among patients. At the same time, clinical recommendations accepted by specialists in the field of medical management are themselves far from always grounded in the principles of evidence-based medicine; but there we are already talking about the influence of external factors, such as the distribution of resources. The rejection of the principles of evidence-based medicine by patients is often based on ignoring their personal experience and an insufficient level of epistemic trust in them. Here we are faced with an example of situational epistemic injustice.

Let us try to model a situation in which we have four types of epistemic agents interacting, who are in a situation of making a common decision, which is the best possible solution to a problem (for example, the best therapy option for treating a certain disease). Each type of agent has specific competence in their own domain.

(1) Patients — have knowledge of their own bodily experience but do not have specialized medical expertise.
(2) Doctors — have specialized medical knowledge and clinical experience.
(3) Experts — have knowledge of the results of medical research conducted using evidence-based methodology.
(4) Managers — have management experience and organizational interests, and are guided by expert opinion as well as resource constraints.

It should be noted that at least agents of types 1 and 2 can have characteristics of marginalized groups in a situation of epistemic injustice, therefore bias must be included as one of the model's parameters. It is assumed that in a situation where the degree of competence in several significant parameters of each type of agent is taken into account, continuous interaction and mutual adjustment of their local knowledge becomes possible.

We propose an agent-based model implemented in NetLogo 6.4 that simulates generalized medical decision-making as an epistemic situation through the lens of Bayesian epistemology. The model integrates dynamic belief updating with considerations of epistemic injustice, aligning with the formal framework for integrating diverse information sources and updating degrees of belief that Bayesian models provide. This type of model can also be applied to other epistemological situations with appropriate correction.

Interaction between agents occurs within an epistemic landscape, which represents a space of possible solutions, each characterized by a value $V(x)$, which determines its effectiveness or quality. The goal of the agents is to find the global maximum of this function, i.e., the best solution x^*, for which $V(x) = maxV(x)^*$. In computational experiments, the landscape is modeled as a random function, where $V(x)$ for each $x \in X$ is generated independently from a uniform distribution on the interval $[0,\ 100]$.

Each agent has a degree of trust, both in itself and in its area of expertise. This level of trust influences the weight with which information received from one agent is considered by another. This allows us to model the differentiated perception of information depending on role, reputation, and area of expertise. During interaction, agents exchange decisions and update their beliefs based on a Bayesian approach, in which new data (in this case, decisions and their values) update the probabilities that a given

decision is the best one. This simulates rational belief updating, in which the credibility and authority of the source play a key role. The model takes into account the competence of agents, which influences the accuracy of information exchanged during interaction, and allows agents to make more informed decisions based on trust and information quality.

The agent interaction mechanism is implemented as a probabilistic process in which an agent selects a random partner, compares the quality of the partner's proposed solution with its own, and updates its belief if its trust in the partner and their area of expertise is sufficiently high. This approach reflects real-world knowledge exchange processes, where people and professionals argue, discuss, and adjust their beliefs based on trust, authority, and credibility. The model includes the ability to configure the number of agents of each type, the level of trust in them and their areas of expertise, and the number of simulation steps. This allows us to explore how different trust configurations influence belief dynamics and the achievement of consensus among agents on the best solution. The goal of the model is to demonstrate the conditions under which the maximum number of agents converges on the global maximum of the epistemic landscape — that is, the best solution — and achieves consensus.

During the experiment, we will consider three situations of modeling the level of trust in agents interactions. It is possible to flexibly configure the values of parameters such as trust in agents in NetLogo. We will use 100 agents of each type in the model, which interact with each other and with agents of other types over 300 iterations.

The first situation is that of limited epistemic diversity. In the model, this denotes a fairly high degree of trust in each agent in his area of competence, and at the same time preserving clear differences in the level of trust in each of the areas.

	personal experience (0.5)	clinical experience (0.7)	evidence-based medicine (0.9)	distribution of health care resources (0.3)
a_1 (Patient)	0.9	0.1	0.1	0.1
a_2 (Doctor)	0.1	0.9	0.5	0.3
a_3 (Expert)	0.1	0.5	0.9	0.2
a_4 (Manager)	0.1	0.3	0.2	0.9

Table 1. The situation of the limited epistemic diversity

The study found that, for given levels of trust in domains of knowledge and agents (0.9 in evidence-based medicine and 0.9 in experts in their field) and a population of 100 agents of each type (patients, physicians, experts, managers), approximately 75–85% of agents (primarily experts and physicians) reached agreement on the best solution to the epistemic landscape within 300 iterations. Patients and managers, possessing high trust in their domains but having lower relevance to identifying the optimal solution, had a limited impact on convergence. This leads to the conclusion that maximum consensus efficiency is achieved under the conditions of dominant expert influence in evidence-based medicine, whereas trust in personal experience and resource management does not contribute to convergence to the best solution.

The second situation is that of epistemic injustice. In the model, this denotes a fairly high degree of trust in each agent within their area of competence, while at the same time introducing systematic differences in the level of trust assigned to each area of expertise.

	personal experience (0.1)	clinical experience (0.7)	evidence-based medicine (0.9)	distribution of health care resources (0.3)
a_1 (Patient)	0.1	0.1	0.1	0.1
a_2 (Doctor)	0.1	0.1	0.1	0.1
a_3 (Expert)	0.9	0.9	0.9	0.9
a_4 (Manager)	0.5	0.5	0.5	0.5

Table 2. The situation of epistemic injustice

In the second model, constructed under conditions of epistemic injustice — when patients are distrusted even in their area of expertise (personal experience) — the system exhibits a fundamental cognitive dysfunction: although physicians, experts, and managers actively interact and can formally converge on a point that maximizes a given alignment score, this "highest point" proves illusory, as it is based on incomplete data and an artificially low weight of personal experience (0.1). Without access to genuine patient knowledge, professionals optimize decisions within an information bubble, which leads either to a local rather than a global maximum, or to divergence within the group of "authoritative" agents themselves — especially if their initial preferences differ and patient feedback is absent. As a result, not all 300 professionals reach even formal consensus (approximately 65–70% of

agents), and the truly best solution — one that reflects reality — remains unattainable for the entire system. Thus, epistemic injustice not only excludes patients from the cognitive process, but also undermines the rationality of the expert subsystem itself, making complete and meaningful convergence to the true optimum impossible.

The third case describes a situation of epistemic equivalence across all domains and all agents without any restrictions. This is a situation in which expertise loses its significance, as every judgment becomes equivalent to an expert judgment.

	personal experience (0.9)	clinical experience (0.9)	evidence-based medicine (0.9)	distribution of health care resources (0.9)
a_1 (Patient)	0.9	0.9	0.9	0.9
a_2 (Doctor)	0.9	0.9	0.9	0.9
a_3 (Expert)	0.9	0.9	0.9	0.9
a_4 (Manager)	0.9	0.9	0.9	0.9

Table 3. Epistemic equivalence

With uniform trust (0.9 across all agents and domains), when expertise is not taken into account, the model loses the ability to discern the reliability of information, leading to a blending of beliefs, slower convergence, and a reduction in the number of agents achieving the best solution. This demonstrates that differentiated trust is a key factor for effective agent interaction and rational agreement.

As we can see, a situation in which limited epistemic diversity exists allows for a better solution to the epistemic problem in a greater number of cases. A situation of epistemic injustice, however, reduces this figure, but not significantly. This may indirectly indicate that some degree of inequality may be present in epistemic practices without significantly reducing their success. At the same time, the absolute absence of inequality makes it difficult to find better solutions in principle. However, it should be understood that this model is highly simplified. Ideally, one should model the interaction between unique agents with a larger number of variable parameters. In that case, the results of such modeling could help reveal the more complex structure of epistemic diversity and illuminate pathways for overcoming epistemic injustice.

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Проблема эпистемической несправедливости и многоагентная модель эпистемического разнообразия

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Аннотация: В данной статье эпистемическая несправедливость рассматривается как фундаментальная эпистемологическая проблема, подрывающая возможность получения достоверного и полного знания. Автор рассматривает различные формы эпистемической несправедливости, включая свидетельскую, герменевтическую, ситуативную, инверти-

рованную и взаимную, демонстрируя, как эти явления проявляются в медицинском контексте и за его пределами. В статье представлена многоагентная вычислительная модель, реализованная в NetLogo, которая имитирует принятие медицинских решений посредством байесовской эпистемологии с участием четырех типов эпистемических агентов: пациентов, врачей, экспертов и менеджеров. Результаты подтверждают аргумент о том, что эпистемическое разнообразие — это не просто проблема социальной справедливости, а эпистемологическая необходимость, согласующаяся с веристской социальной эпистемологией (Голдман), перспективным реализмом (Массими) и агентным реализмом (Барад). В статье делается вывод о том, что преодоление эпистемической несправедливости требует не только этической коррекции индивидуальных предубеждений, но и более радикальной трансформации институтов знания для интеграции различных точек зрения при сохранении критической дифференциации эпистемической компетентности.

Ключевые слова: эпистемическая несправедливость, эпистемическое разнообразие, байесовская эпистемология, многоагентное моделирование, веристическая социальная эпистемология, перспективный реализм, агентный реализм, принятие медицинских решений.

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