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How to Fight Linguistic Injustice in Science: Equity Measures and Mitigating Agents

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Though a common language of science allows for easier communication of the results among researchers, the use of *lingua franca* also comes with the cost of losing some of the diverse ideas and results arising from the plurality of languages. Following Quine's famous thesis about the indeterminacy of translation, we elaborate on the inherent loss of diverse ideas when only one language of science is used. Non-native speakers sometimes experience epistemic injustice due to their language proficiency and consequently, their scientific insights get marginalized. Thus, it is important to epistemically include the results of all researchers independent of their native language. As a solution, we promote epistemic equity and inclusion both on the individual level and on the level of the scientific community. Epistemic equity means that researchers who suffer disadvantages because of their language skills get support from the rest of the scientific community that will compensate for their disadvantage and at the same time facilitate their epistemic inclusion. This can be achieved through the introduction of mitigating agents - the individuals and organizations that ought to serve as a communication bridge between individual researchers and the scientific community.

Keywords: linguistic injustice, science, equity measures, mitigating agents

1 Introduction

Harald zur Hausen's scientific team famously discovered that cervix cancer is caused by human papillomavirus (HPV) and created a vaccine for a disease that took more than a quarter of a million lives annually (Parkin & Bray 2006). For this discovery zur Hausen was awarded a Nobel Prize. However, when zur Hausen's team initially presented the findings at the *Second International Conference on Papilloma Viruses* they were not

well received and it quickly turned into 'a little bit of chaos' (Cornwall 2013). This was partially due to the suboptimal English skills of zur Hausen's team (Cornwall 2013). Despite the initial mistrust towards the results, today the vaccination against HPV as prevention from cervix cancer is being widely implemented. This is an example of how the language barrier created an obstacle for the scientific community to catch up with the life-saving findings. It prolonged the time until the vaccine against the disease was developed.

The problem of language barriers is not a new topic in the field of epistemology. The case of zur Hausen's team can be analyzed in Quinean terms of indeterminacy of translation. Moreover, in recent years, the awareness of the negative effects of linguistic injustice in science is rising (e.g., Koskinen & Rolin 2021; Pronskikh 2018). Apart from the scientific research on the topic, social initiatives are brought up, such as the 2021 *Barcelona Principles for a Globally Inclusive Philosophy*[1]. All of this makes the quest of answering the question of how we can successfully fight linguistic injustice in science more pressing.

Though the common language of science undoubtedly facilitates the exchange of scientific findings, numerous quantitative and qualitative studies have shown that non-native speakers are disadvantaged. For instance, using focused groups consisting of foreign graduate students, Tardy (2004) discovered that participants highly valued the existence of a common language of science. However, they also expressed frustration with their ability to formulate scientific hypotheses in English. They also did not feel well understood by their native-speaking colleagues (Tardy 2004). Moreover, Tardy's

[1] Available at: https://contesi.wordpress.com/bp/?fbclid=IwAR14IwAlLss2p-Ta7reL7CF9wX8EoWWU-z-4ywtMZPCyBgFEvtXoIMwSH8c (Last Accessed 22nd of January, 2022.)

(2004) interviewees pointed out that it would be easier and beneficial for them to write in their first language, but they expressed the fear that this would cause difficulties for scientific journals.

There is a noticeable disbalance between publications in English and other languages. Even foreign scientists cite more often their own work in English than their other work (Grabe 1988). Salager-Meyer (2014) emphasized that English is not simply dominating science, but it is imposed by richer societies on the poorer ones. Indeed, even learning or perfecting one's English requires a financial investment. If we add the costs of a professional proofreading service, we are in the situation in which scientists need to make significant investments both financially and time-wise in order to reach the desired goal of communicating their results to the wider English-speaking audience.

As valuable ideas and findings can get lost due to linguistic discrimination, we argue that it also leads to the loss of epistemic virtues and advocate for the issue to be resolved through affirmative actions and proper mitigation.

Good command of English is perceived as intellectual prestige. The language elitism reflects itself both in spoken and written use. Moreover, the researchers fluent in *lingua franca* have the advantage of being able to read and understand new publications before they are translated. We argue that this is a component of global epistemic justice (cf. *Global Epistemologies and Philosophies of Science* 2021). In order to amend the situation, we advocate for epistemic equity when it comes to the use of *lingua franca*.

We emphasize that the epistemic and linguistic dimensions of inquiry are intertwined. The initial negative reaction to the discovery of HPV is an example of how these two aspects are intertwined. Zur Hausen’s discovery was not initially dismissed *solely* due to his team’s lack of language proficiency, but was subjected to a certain type

of epistemic injustice as well - more precisely, hermeneutical injustice. In section 3, we explore the connection between linguistic and epistemic injustice.

In order to increase both epistemic and linguistic justice in science, we stress the importance of mitigating agents. Philosophers of science have repeatedly emphasized the significance of epistemic tolerance for science (e.g., Straßer et al. 2015) and empirical studies show that scientists also value it highly (Sikimić et al. 2021). Linguistic tolerance is a virtue that researchers should foster as part of their epistemic inclinations for increasing the knowledge on the level of the whole scientific community. Mitigating agents in our sense are not only epistemically tolerant but actively include the marginalized groups and learn about their positionality.

2 Lost in Translation: a Quinean Take on Language barriers

Perhaps a better insight into difficulties that the language barrier creates for the scientific community could be gained if we take a look at Quine's well-known thesis on the indeterminacy of translation (Quine 1960, 2013, 24). This conception is based on a thought experiment in which an anthropologist has to translate an entirely new language into English. As the agent has no previous knowledge of this language, she has to observe the context in which certain words and phrases are uttered and try to guess their meaning based on the conversational context. Since we are unsure whether this new language operates within the same set of notions as English, we cannot be confident in our translation. (Quine 1960, 2013, 25).

Although such a situation seems far-fetched in real-life anthropology, it provides an example of misunderstanding in conversation in which the two sides are coming from entirely different perspectives. Since the notion of science itself refers to a wide variety of research approaches, different perspectives within the scientific community

are bound to arise as well. While these perspectives in themselves often do not have to entail the existence of entirely new languages, the differences in scientific jargon are noticeable. When it comes to scientific discoveries, the indeterminacy of translation might occur in cases in which a radically new scientific concept is constructed in one language and has yet to be translated. This leads to hermeneutical injustice, the concept which will be more thoroughly explored in section 3.

The Quinean solution to such situations relies on the notion of empirical evidence, which represents a foundation of any significant research. As we have seen in the example of anthropological translations, a good strategy to overcome initial indeterminacy would be to pay attention to the context in which unknown words are used. If we agree that the translation of an entirely new language ought to be grounded on empirical evidence, it might seem at first that such evidence could also be used as a foundation of mutual understanding between scientists who come from different linguistic backgrounds. In a real-life situation similar to the one of zur Hausen's team, a scientist who is not a native speaker should share ‘raw’ data as well as the information regarding used methodology. In this way, the research could be repeated and thus independently checked, since the peer reviewers would share the same empirical content as the original author. While this solution seems of use regarding written papers, a whole new class of problems emerges in the matter of spoken English.

If there are noteworthy parallels between Quine's thought experiment and the real-life situation with zur Hausen's team, it is the importance of the empirical context behind verbal communication - be it in its basic form or the more complex scientific presentations. However, it does not seem likely that conference speakers can provide such context since the research takes both time and specific conditions. In such

circumstances, the quality of conference presentation and dialogue with peers could strongly influence whether they will be sufficiently intrigued to look further into findings. Since zur Hausen's team members' English was, in one of them's own words, "limited" (Cornwall 2013, 99) and they could not maintain the conversation due to their poor understanding of the questions, their findings were quickly disregarded. To compare it with the original Quinean scenario, it would be similar to having the anthropologist suddenly wear a blindfold while trying to understand the sentences in the language she had just begun to learn. The spectators were looking for the answers and the presenters were struggling to comprehend what was being asked of them. Both sides ended up deprived of the much-needed empirical context that could have been used as a common ground of understanding.

While this example showcases the way (inexperienced) speakers may get lost in misunderstanding, we would like to use Quine's thesis on indeterminacy to further demonstrate that even more significant losses may occur through translation. Most notably, the losses of entire conceptions and perspectives from different cultures.

Quine (1960, 2013) argued that the problem of indeterminacy arises only during the process of translation. However, once the project is completed and the whole language is translated into English, that translation becomes ‘fixed’ and no longer can become a subject of indeterminacy. The parts of the language that were initially translated incorrectly, are compensated through the translation of other parts. While Quine does not explicitly state this to be the case - we believe that he implies that the unique notions of the unfamiliar language are, in this way, strongly modified to resemble the concepts and even the structure of the English language.

As it was previously stated, when we are being introduced to a thoroughly unfamiliar language, there are no guarantees that the language in question operates within the same concepts as our own. When the anthropologist hears the word *gavagai* and is confronted with a running white rabbit, at first she cannot be sure whether the *gavagai* meant 'rabbit', 'running rabbit', 'white', or even something more obscure such as 'rabbithood' (Quine 1960, 2013, 47). Let us suppose that through the repeated occurrences of the same situation with slight variations, she successfully eliminated running rabbits and the color of white and, thus, came to a conclusion that *gavagai* must have meant 'rabbit'. Let us also suppose that the language in question does not recognize the concept of singular nouns but instead relies entirely on unusual properties such as 'rabbithood'. The anthropologist would return home satisfied with her translation but an important piece of information would still have remained obscured - the concept of 'rabbithood' and its meaning in the structure of the other language.

Though the empirical context is useful in overcoming most of the language difficulties, we argue that, in some cases, it may not be sufficient and that human intervention is needed. There are two reasons for that. First, we are not always able to provide the empirical background sufficient to compensate for misunderstandings in verbal communication (the case of zur Hausen's team). Second, meaningful notions may get lost if they are adjusted to fit the structure of *lingua franca* (the case of 'rabbithood').

3 Epistemic Injustice and Language of Science

Apart from the fact that some scientific findings get lost in translation, another epistemic factor that is responsible for losing ideas in *lingua franca* is epistemic injustice. There are several types of epistemic injustice such as testimonial injustice,

hermeneutical injustice, testimonial-smothering, etc. Epistemic injustice can be both intentional and unintentional, i.e., based on biases and prejudices.

Testimonial injustice is based on Nozick's theory of transactional justice and happens when one discriminates against the testimony of others because they belong to a marginal group (Fricker 2007). Some findings have shown that job applicants with foreign names were less likely to be invited for an interview (McGinnity et al. 2009, 35). In the scientific context, assigning less value to the hypotheses, results, or approaches presented by female researchers would represent a testimonial injustice. It has been stipulated that professionals were more likely to unintentionally discredit testimonials from individuals belonging to marginalized groups and that it affected the choice of words when such testimonials were noted (Beach et al. 2021). It seems likely that such an unintentional misinterpretation would affect researchers from marginalized groups as well, therefore the jargon used to review their work might differ from the one used to review the work of the ones not belonging to marginalized groups.

Moreover, dismissing one's results based on the speaker's knowledge of a foreign language is also a testimonial injustice. In particular, these are cases of linguistic testimonial injustice. For example, discriminating against the zur Hausen's team because of their English proficiency is an example of this type of injustice. As Gissman, one of the scientists in the team, recalls: 'The whole show went down to drain.' (Cornwall 2013, 99) Moreover, he reported skepticism and even aggressiveness among the spectators, which took them by surprise since they could not grasp what went wrong with their presentation. They were proud of their discovery and believed they had prepared a good speech, only for it to end with the dismissal of their findings. Tensions quickly arose on both sides, as the spectators became more agitated and

presenters more distracted. Even zur Hausen's intervention during the dialogue did little to prevent the damage of initial misunderstanding and disbelief that arose as a result of it (Cornwall 2013).

By the time his team encountered the language barrier, zur Hausen was already an established figure in scientific circles and his prominence might have played an important part in restoring the reputation of his team, along with confidence in their results. However, despite him being a highly acclaimed researcher with multiple publications in English, the audience at the conference quickly disregarded his team's findings, at least partly due to their lack of language skills.

If the same situation occurred to the team led by a less experienced researcher, there is a much greater chance their findings would have remained unnoticed altogether. Moreover, if the researchers originated from an impoverished country, they would have had fewer resources for subsequent interpretations that should bring light to the initial misunderstanding. While the translations from German to English and vice versa are done routinely, professional interpreters for some less spoken languages are not as available, and their services might not be as affordable.

Another example is a statistical analysis that Muresan and Pérez-Llantada (2014) conducted with Romanian economists and business university lecturers (Bucharest University of Economic Studies). They based their research on the questionnaire from Ferguson (2011). The results revealed that participants had a negative experience with editors of scientific journals in English, who often complained about their language skills. Participants also felt that native speakers had an advantage in academia and when asked to rank their *own* publications, the highest value was attributed to those written in English, despite the most of them being in Romanian.

Since the most prestigious and the most cited journals are in English and, therefore, more accessible to native speakers, it is no surprise that many non-native scientists often publish their research in lower-ranked journals. As Eric Schliesser suggests in his recent discussion with Liam Kofi Bright and Joshua A. Miller[2], the fact that these lower-ranked journals are often overlooked may represent yet another form of testimonial injustice. While the cases of unnoticed and disregarded papers may vary in subtle ways to the degree that it is impossible to determine whether it was truly a matter of testimonial injustice, the disadvantages of not having publications in English are indisputable.

Hermeneutical injustice is based on Rawls's theory of structural justice and refers to the cases where one does not have the apparatus to express certain experiences because they had not yet been constructed (Fricker 2007). When a scientific discovery is based on new concepts or observations that are not yet fitting in the widely accepted body of theory, significant problems in communication may arise. While the researchers who had come to a novel conclusion naturally do understand the hypotheses and methodology behind it, they may face difficulties when sharing it with peers, especially if the necessary terminology has yet to be established. One of the most valued propositions of every scientific branch is its ability to predict future phenomena and developments. The less the new development has been previously anticipated, the more likely it is that the scientific community will be reluctant to accept it.

In the example of zur Hausen's discovery, apart from his team's English language skills, an important factor was the fact that their findings were unexpected. The hypothesis that widespread cancer can be caused by an oncovirus was something

[2] The discussion is available at: https://twitter.com/nescio13/status/1527568177831587840

rather new for the scientific community. While the existence of oncoviruses as such was previously known to the scientific community, at the time it was believed that they are the cause of rather rare types of cancer and not of the widespread ones. Although the existence of HPV viruses was already known, as well as the high frequency of cervical cancer, the link between the two that was discovered by zur Hausen's team was neither previously explored nor anticipated. Thus, zur Hausen's team experienced both linguistic testimonial injustice and hermeneutical injustice.

While in the case of zur Hausen's team, the harms from the epistemic injustice were eventually resolved, they had to put a lot more effort into reaching mutual understanding. The efforts put into resolving the damages of the initial misinterpretation were both time-consuming and unjustly imposed on the team. The situation would have been probably more easily alleviated had the conference team preorganized the professional translation and interpretation services. However, while preferable, the assistance of professional translators has limited potential. Their knowledge of scientific terminology would have to be up to date even with the most recent and most unusual discoveries. Often, it is too much to expect even from those who are, in general, knowledgeable about the specific research branch, let alone linguists who are only occasionally hired for highly-professional conferences and are usually unfamiliar with the topics before the discussion begins. Moreover, even with the best translation service, a scientific team could still be subjected to testimonial injustice. While the preference for exceptional language skills is, in its nature, superficial, even the most objective researchers may subconsciously favor their more fluent peers.

As a result of both testimonial and hermeneutical injustice, testimonial quieting may arise. It is yet another example of epistemic injustice that occurs when the person is

not perceived as a competent epistemic agent that can damage her epistemic courage and willingness to speak (Dotson 2011). In this way, testimonies of discriminated groups are lost. Testimonial quieting can also have a linguistic dimension. Based on the previous bad experiences, scientists who are not proficient in *lingua franca* may stop communicating their further findings and avoid publishing and presenting in the foreign language. Testimonial smothering is a self-silencing mechanism of agents that expect that their views will not be fully accepted nor appreciated (Dotson 2011).

While the consequences of epistemic injustice can have negative effects on individual researchers, the whole body of science suffers the damage as well, since the data and knowledge of the marginalized agents get lost. One of the recently discovered examples of 'lost philosophy of science' is the case of 18th-century Dutch philosopher Bernard Nieuwentyt, whose work was largely overlooked due to a 'certain linguistic isolation', despite him being an influential figure of his time (Schliesser 2018, 106). He worked on mathematics and philosophy at the time, but his writings were in Dutch. While his research became obsolete in modern times, the scientific community in the past could have benefited from it. Therefore, since the injustice inflicted by the scientific community harms the community itself, it should also become a source of solution, especially considering that debiasing needs to be both institutional and individual.

4 Linguistic Diversity and Tolerance

In humanities, language plays a vital role as some findings are related to the specific language. For instance, one can reasonably wonder whether Plato would have developed his theory of ideas if he were using Latin instead of Old Greek. Latin, unlike Old Greek, does not have indefinite articles, which are closely related to Plato's notion

of ideas. There is a tension between a universal language of science and the plurality of languages used in humanities which brings new insights in the field and it is deemed that one *lingua franca* does not provide sufficient basis for the entirety of scientific knowledge.

If we briefly return to the Quinean example, it seems that the concept of 'rabbithood' may have 'survived' the process of translation, had the translator refrained from trying to adapt it to the English language. The fact that some concepts are untranslatable is an argument in favor of pluralism of different scientific languages, i.e., in a pluralist picture epistemic diversity is preserved. The concept of untranslatability in itself is, thus, neither a virtue nor a vice in scientific research; it is simply a fact that needs to be taken into account in order to enrich the findings.

From the perspective of social epistemology, it is generally beneficial to have epistemic diversity (Kitcher 1990). Apart from increasing the ideas and approaches in a field, epistemic diversity also guides a scientific community towards more reliable findings (Zollman 2007, 2010). Diversity of language practices is a special case of epistemic diversity and is fundamental in keeping research practices open for scientific discussion. For instance, Lillis et al. (2010, 124) discovered a high percentage of self-citation in English-centered publications (10-12%), while this was not the case with local journals published in other languages. Same authors (Lillis et al. 2010, 130) also reported that scientists were sometimes asked by the editors of international journals to cut the references in other languages, a common practice which they referred to as 'Anglophone centre gate keeping' (Lillis et al. 2010, 110).

Thesis in favor of linguistic diversity is also present in anthropological studies regarding the notion of *cultural translation*. While some authors (Jakobson 1959; Butler

1996) argue for the inclusion of some sort of *extralinguistic (cultural) assumption* into translation, others (Buden et al. 2009) believe that the cultural dimension is already a necessary part of any translation. Whatever our beliefs regarding the best course of translation might be, the one thing is certain - there is a broad consensus that culture is an integral part of any language.

The idea that researchers' diverse cultural backgrounds could broaden the scope of knowledge is present even in the works of authors who denounce the extent of damage caused by linguistic injustice. Hyland (2016) argues that the *situatedness* of a researcher is a valuable asset since those who come from different linguistic backgrounds could shed light on problems and points of view that are unique to their culture. While we agree that the notion of situatedness is an argument in favor of linguistic pluralism, we also feel that linguistic (in)competence leads to *isolation* more than Hyland believes to be the case[3]. *Lingua franca* contributes to the creation of a dominant academic culture that is currently coming from Western countries. This leads to both hermeneutical and testimonial linguistic injustice. More specifically, due to the linguistic injustice, the findings of the researchers from underrepresented countries will harder make it to the mainstream, while their arguments will be taken with less consideration.

As we have seen in the example of zur Hausen's team, language makes an impact on natural sciences as well, albeit in a more practical sense, since the issue, in this case, was not a matter of cultural differences *per se*, but rather the scientists' language skills.

[3] He claims the evidence of linguistic injustice is more speculative in nature and that other factors, such as the lack of experience or being part of a smaller scientific community, are the main causes of the isolation of researchers (Hyland 2016). While we do agree there are a plethora of reasons for one's isolation, we shall try to prove that language proficiency is as important as the rest of them.

From the perspective of contemporary science, interdisciplinary projects that use the knowledge from different fields require the merger of different scientific language practices. In a complex situation, such as the Covid-19 pandemic, the interdisciplinary methodology is required to successfully distribute medical care and vaccines. Epidemiologists, psychologists, sociologists, and political scientists have to work together and, thus, their respective scientific jargons are bound to appear throughout this complex interdisciplinary enterprise. Moreover, since the crisis affects the entire world it is expected that significant contributions are going to be published in many different languages, even if all of them belong to the same discipline. Thus, it is important to include them in the mainstream scientific protocols. For this, a certain level of linguistic tolerance is required. The cases such as this one are of particular interest since they represent a perfect example of the intersection between natural science, social science, and humanities. While this convergence provides more elaborate and diverse scientific data, it also entails a higher level of linguistic tolerance. It does not require just the reconciliation of different natural languages, but also of the different scientific terminology. There is a need for mutual understanding between scientists from different research fields. Moreover, researchers work in collaboration with civil servants - who do not need to have a scientific education - but still need to understand the recommended measures to be able to implement them.

Furthermore, linguistic tolerance, as understood as openness towards different languages and their users in situations in which there is a tension between standard forms of *lingua franca* and the other language, may reduce the cases of *linguicism* in science. Language strongly influences which national subgroup one will be associated with. Linguicism or linguistic discrimination is a phenomenon of the dominance of a

more influential language over the less influential ones (Skutnabb-Kangas 1988) Control and domination may get enforced via language, which further might lead to unwanted assimilation (Wang 2008, 32) or unconscious social ranking (Pronskikh 2018, 73) that further harms the speakers of certain languages.

Linguistic tolerance should be practiced by the whole research community with an emphasis on editors, reviewers, and funding bodies. It extends from the inclusion of different scientific jargons over the charitable attitudes towards presenters from all nations and origins and to an open attitude towards journal publications in other languages.

While the use of *lingua franca* facilitates scientific collaborations and a wider peer review of research, keeping the plurality of languages is important because of their richness. Thus, the epistemic virtue of a scientific community is finding the right measure of linguistic tolerance and use of *lingua franca*, while keeping in mind that the chosen *lingua franca* is contingent. However, it should be kept in mind that the choice of *lingua franca* strongly depends on historical circumstances and contemporary social climate. Moreover, the history of previous *lingua francas* showcases that the more economic and cultural power the society possessed, the more likely their spoken language would become dominant across other cultures and societies. Greek was the dominant language for almost 800 years due to cultural and political reasons. It was succeeded by Latin due to the influence of the Roman church which kept using it long after the fall of the Roman Empire (Samarin 1968, 663). It is of no surprise that the history of British colonialism and further cultural dominance resulted in linguistic domination as well.

Liberty and openness that come with the use of lingua franca are, therefore, debatable. As Gobbo and Russo (2020) notice, freedom is only the *a posteriori* quality of *lingua franca* since the language is inseparable from its origin. While their research primarily focuses on the use of English in analytic philosophy, we believe that the same reasoning may apply to science in general. Linguistic dominance in one branch of research is often accompanied by a linguistic authority in other fields, and this reign of *lingua franca* could be traced to the cultural and economic power of the ethnic group that is native to that language.

Despite Chinese being the most spoken *native* language in the world, it could qualify only as a "regional *lingua franca*" among Asian minorities (Pennycook 2012, 147) while English maintains its authority worldwide due to the persistent cultural influence of Western civilization. Although socioeconomic power significantly contributes to language dominance, it could be argued that it is a two-way street. The linguistic presence of the marginalized agents could contribute to the broader recognition of their ideas and, thus, a better chance of succeeding in many fields, including, but not limited to, science.

5 Epistemic Equity and Inclusion

Although the correlation between inequality in the scientific community and differences in productivity has been explored for a quite long time (Allison 1980), the roots of such an unequal representation are a relatively new topic of interest. For instance, Anderson (2012, 170-171) explores the correlation between hermeneutical and testimonial injustice and argues for integration and equality as the epistemic virtues of institutions. However, we would like to strengthen her thesis as we argue for equity and inclusive practices in science. Despite having the notions of *inclusion* and *equity* mostly used in

the context of education and social justice, they may also be of use in the context of discussions regarding *epistemic* justice.

According to Visle's (2003, 21) conception, inclusion is a process that is focused on structural changes in education in order to meet all the individual needs, instead of assimilation of students to the existing curriculum. We argue that similar strategies may be applied to a scientific community as a whole since it has a lot in common with education settings. An experience of a foreign scientist trying to navigate the research and reviews in *lingua franca* will in many aspects resemble the experience of a student moving into a different state - confusion, isolation, and the lack of communication being some of them. On the other hand, the scientific community will often overlook her effort and achievements because she is not used to the group dynamic. Lack of communication and mutual understanding is bound to create a gap between the individual and a group and will often lead to epistemic injustice.

One of the more prominent models of epistemic justice is provided by Helen Longino, who created the concept of 'tempered equality' (Longino 2001). According to this concept, a researcher's representation and respect in the scientific community should be based *solely* on her achievements and intellectual contribution regardless of any other aspect of her life – social status, gender, race, etc., (Longino 2001, 131). While this model provides a brilliant insight into virtues that epistemic justice should be based on, it remains unclear which steps ought to be taken for the scientific community to truly transform under these guidelines.

There is a useful distinction between equality *de jure* and equality *de facto* (Medgyes & Kaplan 1992, 72) or even the distinction between formal and substantive equality (cf. Miller *forthcoming*). The basic idea behind both of these distinctions is

that, while the principle of equality is usually formally universally recognized, in practice it is occasionally ignored - whether intentionally (due to some prejudice) or unintentionally (due to the lack of recognition of the specific needs of the marginalized groups[4]).

How do we come from equality *de jure* to equality *de facto* in order to avoid epistemic injustice? As Dirk Postma eloquently puts it, one of the most important tasks of modern science is *openness*; that is a provision of 'the equal opportunity of the marginalized in particular to contribute towards the global production of knowledge' (Postma 2016, 1).

On the other hand, it could be reasonably argued that the virtue of equality should not be accepted *prima facie* and that further justification is necessary. Patten (2009) in his 'end-state' argument considered the idea of multiple languages being treated equally despite the (low) number of native speakers. However, he came to reject this idea, comparing linguistic diversity to the concept of religious liberties. While a fair society should provide the circumstances in which religious liberties can be freely expressed, there are no obligations to provide conditions in which every minority religion should thrive equally. Whether the religious community will be prosperous, depends mostly on its members, not society as a whole. However, we disagree with the notion that diversity in a linguistic sense can be compared to religious diversity since the latter does not usually bear the epistemic consequences that are relevant in scientific research, nor does it affect the means of necessary communication of the ideas.

[4] While in the social context this is true for any marginalized group, in the context of this research the focus is mostly on marginalized scientists – i.e., those who are non-native English speakers, who come from impoverished countries that lack resources for quality scientific research, etc.

It has also been argued that there is a trade-off between linguistic justice in general and efficiency (e.g., Wickström et al. 2018). These arguments state that translation is costly and time-consuming. However, they mainly refer to the political and economic settings (Wickström et al. 2018). In science, the situation is different because the plurality of languages increases the knowledge of the community. This is in line with the arguments that cognitive diversity is epistemically beneficial for science (e.g., Zollman 2007). Moreover, tolerance for the speakers of foreign languages does not have to come with high costs. Already tolerance and openness to their linguistic mistakes would help.

From the epistemic perspective, both the exchange of ideas that the use of *lingua franca* provides and the research conducted in different languages are beneficial for the goal of maximizing scientific knowledge. Thus, in the scientific context we do not talk about a trade-off, but rather about a necessary balance between the use of *lingua franca* and the inclusion of the insights coming from different language perspectives.[5]

The scientific community suffers from a whole array of unjust treatment such as gender imbalance, underrepresentation of minority groups, bullying of junior scholars, elitism, etc. (e.g., Huang et al. 2020; Yamada et al. 2014). Since researchers from

[5] Apart from the epistemic considerations, one can also investigate ethical grounding for linguistic plurality. Normative justification for equity can be grounded in Rawls' second part of the second principle of justice, in literature known as the *difference principle*. According to this principle, social and economic inequalities are justified if they are 'attached to positions and offices open to all' (Rawls 1971, 1999: 53). Rawls offers a few interpretations of this openness - one of them being based on liberal equality - according to which certain positions are not just formally open to anyone, but also realistically achievable (Rawls 1971, 1999: 63). Unequal distribution of social and economic resources is justified if it predominantly benefits the ones who are least privileged in a given society. This interpretation allows individuals from the marginalized social background to deserve the same recognition and opportunities as their more privileged peers. While Rawls himself does not engage in an inquiry of the scientific community, nor does he use the term of equity, it seems that his definition of justified inequality resonates with benefits we argue should be given to less-privileged researchers. However, such argumentation is more applicable in ethical than in epistemic context, since it cannot guarantee *epistemic* diversity, but only the fair treatment in a *moral* sense.

underprivileged groups are significantly disadvantaged, equality of opportunities might not suffice to amend the situation. The idea of guaranteeing the equality of outcomes might be appealing as it in the long term improves the unjust situation. What does this mean in the context of linguistic injustice? Currently, the native speakers of *lingua franca* have a certain advantage over non-native speakers when it comes to publishing and influencing the research community. However, this situation can be amended by for example adding additional funding in language editing services, but also with the increase of linguistic tolerance towards the work of non-native researchers. In this context, the work of non-native speakers will get a more charitable reading by the reviewers – which is a type of affirmative action. Apart from the fact that such a measure does not significantly increase the costs of publishing, it comes with a great benefit of epistemically profiting from the diversity of scientific results.

In this context a step forward would be to follow the principle of *equity*. Equity, in its broadest sense, would entail the incorporation of the socioeconomic background of researchers and scholars. In the context of education, it also entails specific phenomena that are culturally related and relevant in scholars' respective communities, thus enabling students to express themselves in ways that allow them to connect scientific materials with their own experiences (Penuel & Watkins 2019, 204-205).

The same criteria can and should be applied in scientific communities as well. Moreover, we argue that the *only* achievable science policy that could contribute to the elimination of both hermeneutical and testimonial epistemic injustice ought to be based on the notion of equity. When the concept of equity is put into practice, it would entail that those who lack certain privileges should be provided with specific benefits that are sufficient to compensate for their (in this case - socially constructed) shortcomings.

Firstly, the privileges of native English speakers ought to be recognized. One of them is that English is the *lingua franca* of science and, thus, most prestigious and influential journals are published in English. Therefore, they are much more accessible to native speakers, while scientists from other countries have to put an extra effort into perfecting their language skills to be able to make their results 'visible' to their peers. It should also be mentioned that English-speaking countries or even those in which English is commonly perfected through general education tend to have more resources for scientific research compared to those in which English is not commonly used (Salager-Mayer 2014).

Secondly, the principle of equity ought to be extended to other types of epistemic injustice, since they are often intertwined. Cases of prejudice based on researchers' race, gender, and ethnicity ought to be recognized in order to be avoided. A good step forward would be to independently compare reviews given to male vs. female, white vs. non-white researchers, etc., to explore whether the quality of assigned reviews correlates with researchers' personal information. The positionality statements that are, as of recently, required by some journals could serve as a basis for affirmative action.

Thirdly, the concept of linguistic diversity ought to be recognized as a valuable asset in achieving both social and epistemic justice. The concept of language preservation as a political stance could benefit both the academic community and the individuals that are part of it. Pluralism of languages contributes to the pluralism of the ideas, as well as a greater representation of researchers from diverse backgrounds.

While the short-term effects of the implementation of equity measures are bound to create more obligations for the scientific community, e.g., more resources put in peer

reviews, the long-term effects outweigh them. It may even be argued that the community as a whole would benefit from the equity even more than the individual researchers. The body of science could grow significantly, which could lead to further conclusions in a relatively short time.

As we have demonstrated, the best way of achieving equality *de facto* is to follow the principle of equity, which would also lead to a more inclusive academic environment. Though the integration by itself may be a step forward towards a more diverse scientific community, it would still impose a great responsibility on individual researchers who would be expected to assimilate into the existing community. Inclusion is a process that works both ways; while the individual researchers are equipped with the necessary tools to manage better in the scientific community, at the same time the community is continuously evolving to meet everyone's respective needs and perspectives. In the following section, we shall discuss the concept of *mitigating agents*, who we believe may be the central figures in achieving equity and inclusion.

6 Mitigating Agents: Leaders Towards Better Scientific Community

The concept of mitigating agents refers to all the individuals and groups that can facilitate the exchange of scientific findings across languages. As some notions are particularly difficult to translate and since the plurality of languages enriches scientific discoveries, agents who can help in promoting and translating scientific concepts transnationally are valuable for the research community.

From the global perspective, mitigation is helpful on several levels: firstly meaning that the criteria of the general language of science should be weaker. Native speakers should be encouraged to adapt their language to the audience, speak more slowly at conferences when needed, use widely known vocabulary when addressing

foreigners, etc. We believe that a lot can be learned from interdisciplinary conferences where the researchers present their findings in a way that can be comprehended by those who belong to different branches of science. If scientists from diverse fields can reach mutual understanding, we do not see why the same would not apply to speakers of different languages.

Moreover, we believe that certain steps ought to be taken to make scientific materials and journals available for scientists who are non-native English speakers. Short-term solutions include free proofreading and translation as well as the availability of new technologies, such as *Grammarly*[6] at the cost of research facilities.[7] The long-term ones should focus on building a multilingual scientific community in which all the relevant papers and materials are professionally translated to and from as many languages as possible.

Furthermore, more attention should be given to national journals and the promotion of bilingual ones which can be achieved with incentives such as prizes for outstanding articles, but also by the awareness and respect from the academic community which in turn guarantees the status of academic prestige for articles published in them. According to Koskinen and Rolin (2021, 121-122) journals in the Spanish language, which make up a large number of academic publications, do not discriminate against references in different languages. While the same practice has yet to be established in English-written journals, this example shows us that publications in

[6] The platform for assisting non-native English speakers in writing, by algorithmically correcting mistakes. https://www.grammarly.com/

[7] It is worth noting that the editorial board of *Social Epistemology* participates in editing the final version of a manuscript and, when needed, even offers a pre-editing service. This pre-editing process includes occasional reformulation of the title and the abstract so that the non-native speaker gets the best possible feedback on their paper. This is an example of a good mitigation practice and an important step in assisting non-native speakers.

widely spoken languages can become more language-inclusive without losing their credibility. Therefore, we advocate against cutting references in other languages.

The idea of bilingualism in scientific publications is becoming more and more prominent in philosophical debates that question the concept of the uniform language of research. Gobbo and Russo (2020) argue for all of the papers to be published in two languages, with one of them being the language of the authors' choice. This criterion, if applied in the current academic setting, could significantly benefit the non-native speakers. It would allow them to express themselves in their respectful languages, while at the same time their ideas would become more approachable to a wider scope of readers.

When it comes to science funding, grant reviewers should practice linguistic tolerance, while financing should be distributed cross-nationally. Not unlike the journals, large scientific conferences usually accept only those papers that are written in *lingua franca*, while the local ones are usually overlooked by a vast majority in the community. Therefore, the role of mitigation should be extended from the translation of written papers to the translation and occasional interpretation of live speech.

The availability of adequate translation is only the first and currently the most achievable step toward a more inclusive scientific community. While interpretation is not only helpful but also necessary in avoiding misunderstandings in conversations, researchers who rely on translating services could still fall victim to testimonial injustice and academic elitism. Moreover, this type of translation may not always accurately interpret phraseology unique to the speaker's native language. Therefore, we advocate for the openness toward multilingualism and multiculturalism in the scientific community. While no single course of action can contain all the prejudice at once, we

believe that the appreciation of foreign languages and normalization of their use could significantly contribute to a more inclusive community.

It should be noted that there have been significant improvements in the technology used in translation. Even at this time, some applications for online communication provide decent transcriptions of live speech. It could be expected that such transcriptions may soon become available even for communication where participants are in the same room. The proliferation of live transcriptions may enable even the most rigid participants to gradually focus less on speakers' specific dialect and intonation and more on the substance of the speech. Finally, automated translation services could in the future become more used in academic conferences.

It should be kept in mind that the main goal of mitigation is to earn trust through genuine and continuous openness that goes beyond occasional translation and peer reviews. To establish the trust of the underprivileged researchers, the academic community should keep the channels of communication open. As Leefman (2021, 6), who also explores the consequences of hermeneutical injustice, notices: ‘A person who is deprived of the communicative resources she needs to make sense of her experiences cannot adequately use her epistemic faculties and abilities.’ While his research is mainly aimed at communication in healthcare settings, we believe his conclusions regarding the importance of openness towards unusual perspectives (Leefman, 2021, 9) may as well apply to our case of researchers who are also affected by hermeneutical and testimonial injustice.

From the perspective of individual researchers, steps towards mitigation involve nurturing epistemic tolerance and openness. The openness should extend to the possibility of an interdisciplinary approach that is occasionally necessary to reconcile

cultural differences and linguistic barriers. This is particularly important for journal editors and peer-reviewers.

When it comes to translation, apart from the professional linguistic service, researchers who speak different languages and understand various academic cultures are particularly important for mitigation, as they can shed light on new discoveries and concepts. Their mitigation goes beyond simple linguistic translation, as they can perform additional experiments, tests, or add new arguments in favor of the hypotheses that arise trans-culturally. In this sense, learning new languages is an asset of a researcher.

Schliesser (2018, 110-111) has offered a list of five virtues that translator-advocate in philosophy should possess. These features can be modified and applied to the general scientific context. This specifically applies to the third virtue that refers to the ability to successfully frame and present the new discoveries to the audience that is not used to language in which it was initially published and, in some cases, even not familiar with the conceptual apparatus of said discovery. The role of a mitigating agent, therefore, is not limited to simply correct translation, but one should also be able to understand the research and actively advocate for it. If this epistemic virtue is properly implemented, it should serve as the basis for overcoming both the linguistic and hermeneutical injustice. It should be kept in mind that while Schliesser here seems to suggest that translator-advocates are a separate group within the scientific community, the same does not need to apply to mitigating agents. The role of a mitigating agent can be taken by any scientist proficient in *lingua franca* and willing to do this task for a certain occasion or a time being. It should be also noted that the role of mitigating agents ought to be limited to scientists in their respective fields since they are

familiar not only with both *lingua franca* and the other language but also with relevant topics in a given field.

To a certain degree, mitigating agents share similarities with the researchers invested in work at an "aggregate level", as envisioned by Lefevere and Schliesser (2014). According to them an aggregate level represents an intersection between scientific research and policy-making. Some of the aggregating roles of a scientist include publication editing and conference organization, which also applies to mitigating agents. Furthermore, researchers working at this level should also be open-minded to the other disciplines and approaches to be able to create adequate policies.

However, in the case of mitigating agents, pluralism of the disciplines should also be extended to the pluralism of languages and cultural backgrounds. While "scientists-aggregators" can in certain circumstances decide to ignore marginal opinions in their respective fields (Lefevere & Schliesser 2014, 288), mitigating agents ought not to dismiss researchers from small-scale language communities. In general, the role of a mitigating agent is also broader in its responsibilities since it is not limited to publishing and editing but should also include the charitable approach to the ideas and notions of marginalized scientists. It includes a proper translation of unique concepts as well as guidelines for the general scientific community for a better understanding of these concepts.

To summarize, we would like to point out the main characteristics of successful mitigation. Firstly, it should be done with respect to the principle of equity with the main goal of creating a more inclusive scientific community. Secondly, following the idea of inclusion, it should be initiated by more privileged researchers and facilities and

aimed towards those who are underprivileged. Thirdly, it should be both respectful and receptive to different linguistic and cultural backgrounds, as well as new ideas and concepts that might at first seem unusual when translated into *lingua franca*. Finally, successful mitigation needs to establish communication that is based on openness, impartiality and a charitable approach in order to be beneficial for both the individual researchers and the scientific community as a whole.

7 Proportional Mitigation: Balancing the Costs

In the previous section, we focused on the traits and benefits of successful mitigation. We would also like to disclose potential limits to mitigation, one of them being the risk of the native English-speaking scientists becoming overwhelmed with this task. Therefore, we believe that the role of mitigating agents should not be limited to native speakers, but all the researchers sufficiently proficient in *lingua franca*. For instance, exchange students could earn student grants should they choose to volunteer with their peers who are less proficient in English. Senior researchers and professors should also receive financial and reputational motivation for their involvement in mitigation, as well as universities and research facilities that nurture linguistic and cultural pluralism. Not unlike the aforementioned "scientists-aggregators" proposed by Lefevre and Schliesser (2014, 288), the mitigating agents should be granted special recognition and respect in the scientific community.

To optimize the expenses of this enterprise, it may be of use to follow Van Parijs' criterion for linguistic justice (Van Parijs 2002, 71). According to this criterion, the costs of learning *lingua franca* should be proportional to the benefits one derives from such learning. The main benefit, in this case, is being able to communicate with others

and as such, this criterion applies to both native and non-native speakers of *lingua franca.*[8]

While Van Parijs leans more towards uniform *lingua franca* than linguistic pluralism[9], we do believe that a similar type of reasoning may be applied in the context of mitigating agents. We propose that the total cost of mitigation should not outweigh the benefits of such a project. Moreover, we believe that through the inclusion of mitigating agents, the total gross of language learning worldwide would be even smaller than having all the non-native researchers learn *lingua franca*. We also argue that the benefits would be significantly greater if the pluralism of languages and ideas is preserved.

Firstly, from the perspective of a research group, it would be much more cost-efficient if some of its members engaged in the mitigation. Notably, those who are either bilingual or have previous knowledge of *lingua franca* could present the paper at the conferences. In addition to reducing potential misunderstandings in communication, it could also contribute to the elimination of testimonial injustice. Moreover, from the perspective of the scientific community, it is more cost-efficient and epistemically beneficial that researchers who have the necessary knowledge for bridging the gaps between different languages engage in mitigation, instead of having multiple professional translators.

Secondly, the benefits of this pluralistic scientific community would likely increase, since communication and the exchange of ideas will proliferate as well. It would shorten the time between peer reviews of big studies since it would no longer be

[8] That is, assuming that the both groups share the desire to communicate with each other.
[9] In his other works (e.g., Van Parijs 2007, 2011), Van Parijs more openly disputes the idea of linguistic diversity having intrinsic value and sees it rather as a side effect of achieving equal dignity.

required that it is done by researchers from the same linguistic background. Furthermore, the plurality of the ideas will be achieved through the plurality of languages and cultural backgrounds.

A similar strategy may be applied to other measures necessary for the inclusion of marginalized scientists - e.g., grants that are given to researchers in developing countries. Long-term benefits should justify initial costs. We believe that the plurality of research facilities across the globe could enrich both the topics and the findings of the research in a way that justifies the initial expense.

If we briefly return to the Quinean case of an anthropologist studying remote and closed communities, those communities could likely be better understood by someone from that same part of the world. The benefits may be even more prominent in natural science, for instance, the research of endemic species in some of the developing countries. Instead of sending the scientists and the equipment to other continents, wealthy research facilities could invest in the local ones, who would in exchange share the findings with them. This is both time and money-saving, as well as useful for potential further research in the same area.

Moreover, both the COVID-19 crisis and previously the Ebola crisis have shown the importance of mitigating agents who understand the local community and can suggest appropriate medical measures for different parts of the world (Sikimić 2022). On a wider scale, such efforts are understood in terms of epistemic decolonization in science (Mitova 2020). Epistemic decolonization stands for a wider movement that ensures just treatment and increased influence of scientific contributions from underrepresented countries and communities in mainstream science. Therefore, we

believe that the global scientific community is an investment that can benefit both the privileged and the marginalized researchers.

8 Conclusions

The current academic environment expects individuals to fit into certain patterns of scientific communication. Researchers face obstacles while mastering *lingua franca*, as well as being taught how to structure scientific papers and present at conferences. Linguistic injustice slows down scientific progress. In the case of HPV, this had direct negative consequences on human lives. We advocated for a switch in the approach. Instead of teaching people to fit in, it would be better to teach them not to be superficial. The scientific community should focus on being more epistemically open and tolerant. Although there is a long way ahead before the epistemic injustice is fully achieved, as of recently there have been some great initiatives for it to be addressed in both theory and practice. We wish to contribute to this discussion. While integration is a good starting point, we believe that true changes in structure can be achieved only through the process of inclusion which is governed by the principle of equity and supported by proper mitigation.

Firstly, we argue that the standards of both spoken and written *lingua franca* ought to be weaker. Native speakers should adapt their spoken presentations to their non-native peers. At the same time, they should practice openness and tolerance toward different languages and the imperfect use of *lingua franca*. Publishers could aim to make scientific papers more accessible to non-native speakers, for instance, by offering free proofreading and translation services. The same can apply to conference committees that could help the non-native speakers by accepting the presentations in

imperfect English. We also argue that translation technologies that are already in development could, in the near future, greatly contribute to the elimination of linguistic injustice.

We believe that mitigating agents do important work in making the scientific community more open to the pluralism of cultural and linguistic backgrounds. Their previous knowledge of *lingua franca* could enable better communication and facilitate a more suitable representation of underprivileged researchers. Successful mitigation should also be properly balanced, in a way that its cost should not outweigh the benefits. Moreover, all researchers should follow the charity principle when assessing the findings of non-native speakers by assigning meaning and importance to their work. The scientific community as a whole should be governed by tolerance and the principle of equity and, thus, become more inspiring and welcoming to non-native speakers.

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