

The linguistic elephant in scientific publishing

Zhicheng Lin

Contact: zhichenglin@gmail.com

Abstract

Scientific publishing is dominated by English-language journals. Whether the dominance of English in academia reflects inequity—unfairness, bias, discrimination, or injustice—has long been debated. This debate, however, conflates two interrelated yet distinct notions: linguistic inequality and linguistic injustice. Whereas linguistic inequality concerns the unequal distribution of linguistic capital between native (L1) and non-native (non-L1) researchers, linguistic injustice involves the systematic marginalization of non-English research and researchers. Evidence for one does not necessarily imply evidence for the other. Under this framework, we synthesize diverse evidence from multiple disciplines, revealing not only ingrained linguistic inequality but also widespread linguistic injustice, each with distinct manifestations. Addressing linguistic inequity thus requires a targeted, two-pronged approach: reducing linguistic inequality by empowering researchers; and dismantling linguistic injustice through multi-level efforts.

Keywords: language; publishing; disparities; linguistic inequality; linguistic injustice

Introduction

Since scientific journals debuted in the 17th century, the predominant languages for scholarly communication have evolved in tandem with the shifting centers of scientific influence (1). The pendulum first swung from Latin, followed by a period of relative linguistic diversity in which French and German also gained prominence, before finally settling on English as the common language of the scientific community in the 20th century. The rise of English as the lingua franca was mainly driven by economic and geopolitical forces—rather than by its intrinsic advantages for scientific discourse—with far-reaching implications (2). The language hegemony has fostered a more unified global scientific community. Hence, for more than a century, scientists worldwide have adapted to using English to communicate with each other, and in response English itself has evolved to meet the needs of science—imbued with a rich scientific and technical vocabulary.

Yet, the pollination of English also engenders linguistic disparities, relegating other languages to the “periphery.” Since most international and top-tier journals are in English (3, 4), non-native English speakers find themselves obligated to learn English as an additional language (EAL). Although EAL researchers have long lamented the unlevel playfield induced by language disparities (5), whether such disparities reflect *inequity* in scientific publishing—for example, unfairness, bias, discrimination, or injustice—has been strongly contested (6-11). Indeed, two arguments from applied linguistics have often been evoked to counter the notion of language inequity (6).

The first concerns efforts: academic English is no one’s native language—it requires more or less standard disciplinary studies, mitigating differences between EAL researchers and researchers whose first language (L1) is English (8, 12). The second argument has to do with attitudes: academics are more exposed to EAL researchers, potentially making them less susceptible to biases (13). Adding to these arguments is that, notwithstanding anecdotes,

compelling evidence for linguistic inequity seems elusive. Even when piecemeal evidence does get documented, it has yet to be systematically integrated, making language inequity “mostly unrecognized and often difficult to pin down.” (14)

Is language inequity in academic publishing simply a “myth” then (8), or is it instead the “last acceptable prejudice” (15, 16)? To shed light on this contentious debate, below we first distinguish between two distinct types of interpretation of disparities that hitherto have been conflated (6-11, 17): *linguistic inequality* (lack of equality, in the sense of “women are physically weaker than men”) and *linguistic injustice* (unjustified discrimination or prejudice, in the sense of “women are paid less than men despite working the same job with similar performance”). This distinction helps to clarify the nature of disparities, providing a structured framework to organize and critically evaluate scattered evidence.

Our synthesis of diverse evidence across multiple disciplines reveals not only ingrained linguistic inequality—privileges for L1 researchers and disadvantages for EAL researchers—but also pervasive linguistic injustice within academic publishing. Such linguistic inequity has dire consequences—language is both a *manifestation* of and a *means* to social ailments. Because what we think about language reflects what we think about people, language inevitably intersects with canonical diversity issues (3, 15, 16), such as national origin, socioeconomic status, race, ethnicity, and religion. Moreover, dealing with complex global challenges—from pandemics and climate changes to geopolitical conflicts and human cooperation—requires concerted global efforts, and linguistic inequality and injustice risk derailing these efforts. To confront linguistic inequity, this framework calls for a dual-path solution: empowering EAL researchers through effective academic writing training, and dismantling linguistic injustice with multiple-level solutions.

Distinguishing linguistic inequality from linguistic injustice

Not all disparities are the same (18). Inequality, such as sexual differences, might be unfair but could well be natural rather than socially originated. On the other hand, unjustified discrimination or prejudice, such as gender stereotypes and discrimination, stems from deeply ingrained societal norms and attitudes, epitomizing the essence of social injustice (3, 19). Inequality and injustice, in other words, have distinct origins and therefore require different interventions. And we argue that both types of inequity in language permeate academic publishing, though in different ways.

Specifically, in the marketplace of ideas and knowledge, a shared language plays the role of a common currency to facilitate fluid exchanges. But as shown below, not all researchers in this marketplace start with the same capital: the hegemony of English bestows linguistic privileges for L1 researchers and disadvantages for EAL researchers. This *linguistic inequality* reflects a lack of equality in the distribution of linguistic opportunities and resources, with privileges for some and disadvantages for others (3, 19). Importantly, linguistic inequality does not echo the howl of injustice like racism or gender discrimination, but rather hum the tune of unfair competition, where linguistically affluent L1 researchers have an easier stroll through the market. In other words, these disparities may be unfair, perpetuating inequalities between L1 and EAL researchers, but they don’t stem from a place of malign intent or systemic injustice. This is because, to the extent that there is language hegemony, be it English, Chinese, or any other language, a divide in linguistic readiness will always exist between L1 and non-L1 researchers. Consequently, remedies should focus on making resources for learning and mastering English more accessible to EAL researchers.

Linguistic injustice, on the other hand, is an entirely different matter. Such inequity is not intrinsic to language hegemony. Rather, like the high walls encircling the marketplace with guarded gates, linguistic injustice represents the unjustified discrimination or prejudice (3, 19) that stems from biases against scholarship and knowledge from non-English languages and EAL researchers (i.e., “epistemic injustice”). As we will demonstrate, multiple lines of evidence indicate that linguistic injustice is prevalent, perpetuating epistemic injustice through widespread misconceptions of linguistic competence and biases in peer review, evidence synthesis, and epistemic norms.

Unlike linguistic privileges and disadvantages—which relate to fairness in a world that is inherently not fair, from health and intelligence to family and social environments, and can be managed but not eradicated—linguistic injustice must be dismantled. For such discrimination and prejudice not only tighten the noose of injustice around EAL researchers, but impoverish the marketplace of ideas by excluding or marginalizing valuable perspectives and knowledge. Therefore, the presence of linguistic injustice demands solutions that extend beyond learning resources to a more systemic, social level—dismantling the high walls through education, policy reforms, and a broadened acceptance of linguistic diversity.

Linguistic privileges for L1 researchers and disadvantages for EAL researchers

With the dominance of English in global academic exchanges, L1 researchers enjoy an inherent advantage crucial to academic success: speaking—from presenting at international conferences to forging networks and collaborations (20). But when it comes to academic publishing, whether such inequality still persists has been strongly debated (6-11).

As noted earlier, unlike speaking, academic English is no one’s native or first language (8). Writing in general is hard work for everyone. Writing effective academic prose is a specialized competence that requires prolonged training in both substantive and communicative domains, encompassing a mastery of the topical focus alongside a proficiency in clearly articulating sophisticated ideas (8, 12). Therefore, academic writing has been thought to be “equally daunting” (8) for L1 and EAL researchers, and both need to “develop their academic discourse competence in similar ways.” (10) Although EAL researchers may feel greater difficulties than their L1 counterparts in academic writing, this self-reported inequality has been concluded to be “largely speculative” and that “we just don’t know it is the case or not.” (8)

Hence our question: Does the hegemony of English confer linguistic advantages on L1 researchers and disadvantages on EAL researchers in academic publishing? Before addressing this question, we note that the terms “L1 researchers” and “EAL researchers” and their various cousins represent broad categories with significant diversity among groups and individuals—and they are used here to highlight a primary divide in language that could hinder equitable dissemination of knowledge. We are also not questioning the difficulty of academic writing for L1 researchers, or the importance of non-writing factors in getting published, or the ability of EAL researchers to be prolific. Rather, the crux is this: when all other factors are equal, is there a linguistic inequality between L1 and EAL researchers in academic publishing? The research points to a resounding “yes”—L1 researchers inherently benefit from the global dominance of English.

More efforts are required to achieve similar competence for EAL than L1 researchers

Although academic writing is hard work for both L1 and EAL researchers, achieving the same level of competence—for example, writing that is publishable in reputable journals—requires

more effort from EAL than L1 researchers (11). This is because L1 researchers, owing to their early exposure and formal education in English, have a leg up when it comes to mastering foundational knowledge conducive to developing competence in academic writing (21). Such knowledge is ingrained from early linguistic socialization, including nuances of phonology, lexis, semantics, syntax, connected discourse, register, and pragmatics (**Box 1**) (22).

In contrast, EAL researchers counter a more arduous journey (23). In developing writing competence, not only do they lack this implicit, foundational knowledge of English, which must be learned more explicitly, but they must also deal with potential interference (i.e., “negative transfer”) from their native tongue (21). This process necessitates adapting grammar and connected discourse and tackling rhetorical, functional, and cultural discrepancies at various levels. For instance, EAL researchers from China often struggle with article usage (e.g., deciding when to use “the,” “a,” “an,” or no article) and the placement of prepositions (e.g., choosing among “with,” “in,” “on,” “at,” “for,” “about,” and “against”) due to the lack of corresponding structures in Mandarin and regional dialects. Moreover, the inclination towards indirectness in Chinese discourse (24) can hinder the clear, direct expression typically preferred in scientific writing, demanding conscious efforts to align with the rhetorical norms of English academic discourse.

These differences in required efforts are evident when comparing writing in one’s first language to a non-first language. For example, when writing in English compared to their native languages, Mexican and Taiwanese EAL researchers from various disciplines reported an average increase of 24% in difficulty, 10% in dissatisfaction, and 22% in anxiety (25, 26). Similarly, among 49 Colombian EAL researchers in biology, writing in English required 85% more hours than writing in their native language, Spanish (27).

Comparisons between EAL and L1 researchers further reveal the increased efforts required for EAL researchers in writing-related activities. For instance, a recent study involving 908 environmental scientists reveals a striking disparity: early-career EAL researchers from regions with moderate or low English proficiency spend significantly more time writing and reading English scientific papers—51% or 30% more for writing; 47% or 91% more for reading—than their L1 colleagues (20). However, these researchers write and read more swiftly in their native tongues than their L1 counterparts, highlighting the substantial hurdles EAL researchers encounter in academic English per se (20).

The implications of this linguistic inequity extend beyond the realm of academic writing. The increased time and effort channeled into overcoming linguistic barriers means less time and energy for other academic activities or personal endeavors. Moreover, the often compelling need to study abroad to immerse in an English-dominated academic community (28) brings with it a host of challenges—financial, visa, and cultural barriers, with an added layer of potential mental health repercussions.

Box 1. How early linguistic experience builds a foundation for academic writing competence

Through daily linguistic interactions and observations during childhood, L1 researchers develop an intuitive understanding of English that lays a critical foundation for strong academic writing skills (21, 22).

- Phonology—the sound system (e.g., a toddler repeating “b” sounds when saying “baby”)—aids in accurate spelling and enhances word choice and rhythm in writing.
- Lexis—comprising vocabulary, collocations (e.g., “conduct research”; “analyze data”), colligations (e.g., “due to”; “based on”), and lexical bundles (e.g., “with regard to”; “in terms of”)—enables precise vocabulary use and idea expression, as well as idiomatic expressions for more engaging and natural writing.
- Semantics—the nuances of word meaning and interpretation (e.g., “hot” can mean temperature or popularity; “childlike” and “childish” have distinct meanings)—is crucial for interpreting and articulating ideas accurately, which affects tone and nuance in writing.
- Syntax—the rules of sentence structure (e.g., “I want juice”), including active versus passive voice—supports the construction of organized, coherent sentences.
- Connected discourse—using transition words and phrases (e.g., “however”) and signposts to create a logical flow between ideas, and linking sentences into coherent narratives through storytelling—is essential for structuring narratives and arguments.
- Register—the level of formality and style in language use, as dictated by context and audience (e.g., distinguishing between the informal language used in conversation and the formal, precise language appropriate for academic writing)—assists in determining the appropriate tone for scholarly communication.
- Pragmatics—the observation of language subtleties in varying contexts—helps tailor complex ideas to a format that is contextually appropriate for academic discourse. This includes modulating tones and the use of hedging language (e.g., “might”, “could”) to suit different audiences, understanding irony, metaphor, idioms, and cultural references, and appreciating implicatures (unspoken but intended messages).

In summary, from sounds and words to discourse conventions, early and continual exposure to English equips L1 researchers with the essential linguistic skills fundamental to proficient academic writing. These skills include the ability to imply significance, anticipate reader questions, and address them preemptively. EAL researchers, lacking this immersive linguistic socialization, must therefore put in considerable effort to acquire them later through explicit learning and instruction.

Writing quality is an important criterion in manuscript evaluation

“In the marketplace of ideas, truth is the prime value, but not the only one. Another is what it costs us to find it.” (Joseph M. Williams)

L1 researchers generally write more proficiently than EAL researchers in academic English. And better-written manuscripts fare better in the publishing process, all else being equal (11, 29). This is because in the marketplace of knowledge, the value of a paper is determined not just by the merit of its ideas or discoveries but also by the ease with which they can be understood (30). Clear, concise, and engaging prose renders the research more accessible and impactful, thus elevating the quality of writing as a key factor in research evaluation.

Indeed, writing quality is an implicit or explicit criterion in peer review evaluation. For example, **Table 1** displays quotes from relevant instructions to authors and guidelines for reviewers from prominent interdisciplinary and specialty journals, emphasizing the importance of clear, concise, well-organized, and engaging writing. Thus, reviewers frequently comment on language issues in manuscripts from EAL researchers—44% in a sample of medical researchers

from Italy (31) and 61% in a sample of psychological and educational researchers from Slovakia, Hungary, Spain, and Portugal (32). In tandem, interviews with L1 reviewers reveal prevalent negative attitudes toward English that deviates from native-speaker norms, regardless of the merit of the research (33).

These attitudes are further evident in actual ratings and outcomes (34, 35). For example, a comparison between papers written by L1 graduate students (“L1 papers”) and the same papers translated into Chinese and then back to English by EAL graduate students (“EAL papers”) shows that, despite identical content, EAL papers consistently receive lower scores than L1 papers (35). Additionally, the reliability of ratings for EAL papers is lower, raising concerns about the validity of ratings for EAL writing (35). This pattern extends to manuscript submissions: in a study of Colombian biological scientists, over 43% of doctoral students experienced manuscript rejection (or request for revision) due to English grammar issues (27)—a ratio much higher than that of L1 researchers. For example, in environmental science, EAL researchers reported rejections for writing issues at a rate 2.5 times greater than their L1 counterparts (20).

In sum, the effective communication of ideas and findings necessitates proficient English. L1 researchers possess structural advantages in developing writing competence through lifelong socialization. Conversely, EAL researchers are more likely to risk having their manuscripts rejected due to language alone, impeding the dissemination of valuable knowledge and diverse perspectives.

Table 1. Quality of writing as an explicit criterion for manuscript evaluation

| Journal | To whom | Quote with hyperlink |
|---|----------------|---|
| <i>Nature</i> | Authors | “Contribution should ... be written clearly and simply so that they are accessible to readers in other disciplines and to readers for whom English is not their first language” |
| <i>Science Immunology</i> | Reviewers | “[A]ll submissions are reviewed for ..., clarity, and conciseness of presentation” |
| <i>Proceedings of the National Academy of Sciences (PNAS)</i> | Reviewers | “Indicate whether the writing is clear, concise, and relevant and rate the work’s composition ...” |
| <i>Annual Reviews</i> | Reviewers | “Whether the article well organized and easy to read” |
| <i>Perspectives on Psychological Science</i> | Authors | “[R]eadable: the article is engaging and accessible to psychologists across subdisciplines” |
| <i>Academy of Management Learning & Education</i> | Reviewers | “Quality of the presentation of ideas” |
| <i>Journal of Academic Language and Learning</i> | Reviewers | “Papers should be readable and clearly expressed They should be carefully presented and proofread ...” |

Navigating multiple languages requires extra work

Even when EAL researchers attain the same writing competence and efficiency as L1 researchers, linguistic inequality in scientific publishing does not then stop. This is due to a difference in the language context of their research. Conducting scientific research in a non-English linguistic

context invariably demands an additional layer of effort. This extra labor includes translating relevant English texts into the local language to ensure proper engagement of human participants, stakeholders, and broader audiences—texts ranging from questionnaires and scales to international consensus, research discoveries, and educational materials (20). For instance, research materials such as questionnaires are frequently published in English, but to be used in the local context they must be properly translated into the local language and validated to ensure measurement invariance or equivalence (36, 37).

The translation burden extends in the other direction too. The recent open science movement, for example, aims to mandate the availability of research materials, data, and code to facilitate scrutiny and build more cumulative sciences (38, 39). This mandate obliges researchers operating in non-English contexts to translate pertinent materials and documentation into English, such as field notes, interviews, locally sourced materials, and data annotations. This requirement, while fostering global knowledge sharing and instrumental to scientific progress and thus should be vigorously pursued, nevertheless imposes an additional burden—a burden that has been rarely appreciated and largely ignored in current agendas.

And academic translation is no easy task. It requires a nuanced understanding of both the scientific content and the cultural context. At times, indigenous terminologies or local conceptual frameworks might not even have their English counterparts (e.g., the recent “躺平” [*tang ping*, “lying flat”] and “摆烂” [*bai lan*, “letting it rot”] movement in China), and vice versa (e.g., gender and sex are not differentiated in languages such as Chinese). For measurement instruments such as questionnaires and scales, validation extends beyond translation to ensure that the original constructs are measured equivalently across languages—essential for reliable and valid cross-cultural comparisons (36). The process involves cultural adaptation, psychometric testing, and sometimes the development of entirely new items to capture the intended constructs within different cultural contexts (37).

Certainly, these linguistic plights are not exclusive to EAL researchers—L1 researchers venturing into non-English contexts also need to traverse the linguistic chasm both ways. But they are disproportionately affecting EAL researchers, underscoring a nuanced form of inequity ingrained in the global scientific enterprise: the hegemony of English tacitly prescribes additional labor on those venturing from (or into) non-English territories, casting a long shadow on equitable knowledge dissemination.

Language affects the quality of academic training, research, and thinking

Words wield power, language more so. The divide between a lingua franca and other languages creates ripple effects extending beyond publishing—it fundamentally affects the quality of academic training, research, and thought itself. In academic training and research, this inequality manifests in three interrelated arenas: lexical infrastructure; knowledge accessibility; and research quality.

First, the infrastructure for scientific lexicon differs between languages. Over time, English has developed a rich scientific vocabulary that is lacking in many languages, particularly in low-income nations (1). Second, different languages have unequal access to the knowledge frontiers. Because most cutting-edge research is published in English, other languages often have to play the catch-up game, delaying the adoption of best practices, advanced methods, and new knowledge (3). Third, the quality of research published in different languages is not equal. English papers are generally of higher quality, using more robust methodology, such as larger sample sizes (40), better research designs (41), and more sophisticated statistical controls (42).

Consequently, researchers relying on non-English sources and materials—from papers, books, and software to talks and discussions—are left with a knowledge gap, trailing in the wake of English-centric academic advancements.

At the cognitive level, disparities in language—the relatively improvised scientific vocabulary in many languages compared to English, coupled with the lack of English proficiency in EAL researchers relative to L1 researchers—can affect the quality of thoughts (43). The interdependency of language and thought is poignantly captured in E.M. Foster’s expression, “*How do I know what I think till I see what I say*”? It is through the process of writing that we fully develop our ideas. This symbiotic relationship underscores the pivotal role language plays not only in articulating but also in shaping thought itself. Nuanced thinking requires corresponding levels of vocabulary and expression. Conversely, poor writing—described as “a symptom of a deeper malaise” (44)—can impede thinking. Language disadvantages may thus pose a cognitive bottleneck, hindering the innovative thinking essential to scientific advancement.

These linguistic hurdles are compounded by economic, academic, and cultural factors—investment in education and research, the quality of academic personnel, and the prevailing culture of scientific inquiry. Their confluence creates a colossal barricade to scientific progress in non-English-speaking (i.e., non-Anglophone), particularly mid- to low-income regions, thus perpetuating a cycle of inequality (45). Linguistic disparities, therefore, have cascading repercussions beyond publication.

Linguistic injustice in academic publishing

It is clear that academic writing is not “equally daunting” for L1 and EAL researchers, as previously claimed (8, 10). Instead, EAL researchers must exert additional efforts to achieve writing competence comparable to that of L1 researchers, and that the quality of writing affects peer review outcomes. Additionally, managing multiple languages involves extra work, disproportionately burdening EAL researchers. Language also intricately influences the quality of academic training, research, and thinking, particularly disadvantaging EAL researchers from mid- to low-income countries. These findings indicate *linguistic inequality*, highlighting linguistic privileges for L1 researchers and disadvantages for EAL researchers.

However, these findings fall short of revealing *linguistic injustice*, which involves unjustified discrimination, prejudice, or bias. In his recent influential work, Hyland posits that there is “little evidence” of “a widespread and systematic bias against writers whose first language is not English.” (8) Even a subsequent rebuttal by Flowerdew, while countering Hyland, concedes no “systematic empirical evidence for bias” but only “a certain amount of circumstantial evidence.” (21) These lead some to argue that the apparent lack of linguistic injustice may be due to the “‘standardization’ of academic English” and “social norms in academia.” (6) Yet, contrary to these positions, four empirical lines of evidence show that linguistic injustice is in fact prevalent in academic publishing.

Common fallacy: native speakers = expert writers; non-native speakers = novice writers

“I think like a genius, I write like a distinguished author, I speak like a child.”

(Vladimir Nabokov, Russian–American novelist, author of *Lolita*)

A prevalent misconception underlying linguistic injustice is the conflation of L1 researchers (“native English speakers”) with expert academic writers, and EAL researchers (“non-native English speakers”) with novice writers. As shown in **Table 2**, this normative assumption is remarkably pervasive across various formats: journal instructions for authors; reviewers’

comments; and journal editorials, guidelines, and opinions. It is held by L1 and EAL researchers alike, appears in both specialized and general journals, and spans publishers ranging from lesser-known to prestigious ones (17, 21, 32, 46-50).

This entrenched bias implicitly elevates L1 researchers to the position of linguistic authority and superiority—“native-speakerism” (51)—conveniently ignoring the reality that writing proficiency derives from prolonged training and effort, not language background by itself. It also commits a cross-level logical fallacy (“ecological fallacy”): the attribution of group differences to individual differences (52). That L1 researchers on average demonstrate higher proficiency in academic writing does not imply that all L1 researchers are experts or that individual EAL researchers cannot attain expertise. Such a fallacy ignores the vast heterogeneity within both L1 and EAL groups, and undermines the potential expertise and unique perspectives that EAL researchers can bring to the academic discourse.

While perhaps well-intentioned as an attempt to avoid hurt feelings by attributing poor writing to group identity rather than individual competence, this conflation of group and individual abilities not only is wrong by itself but also has adverse consequences. First, it creates a false sense of security in L1 researchers about the quality of their writing while ignoring the hard work required to develop expertise (12, 40). Second, it promotes the soft bigotry of low expectations: when EAL researchers are not expected to meet high standards, it inhibits EAL researchers from being held to such standards and challenging themselves to improve their skills (53).

This bias is very much alive and well today—the editorials, guidelines, and opinions in **Table 2** were published as recently as 2022, and all the author instructions are current as of this writing. It is striking, then, that academia remains an active agent in perpetuating linguistic injustice while simultaneously advocating for equity in other social domains (19). Indeed, the very term “native speaker,” as commonly referenced in **Table 2**, originated in the context of 19th century European nationalism and colonialism, linking linguistic identity to national identity and colonial hierarchy. In the field of English language acquisition, this term was co-opted to conflate language with race—positioning white speakers as more authoritative than non-white speakers of English (54). Despite the potential stigma associated with the “non-native” label (21), it is used here both in keeping with the quotes in **Table 2** and as an act of reclamation—to subvert its negative connotations.

In the context of academic writing, dismantling linguistic injustice requires recognizing that despite group and individual differences, despite privileges and disadvantages, L1 and EAL researchers alike must strive to master the rigors of academic writing. Ultimately, competence stems from effort and experience, not linguistic identity. What Joseph Conrad, Vladimir Nabokov, and José García Villa achieved in English literature as non-native English speakers, EAL researchers can draw inspiration from.

Table 2. Common fallacy of native speakers as expert writers and non-native speakers as novice writers

| Category | Source | Quote with hyperlink |
|---------------------|----------|--|
| Author instructions | Elsevier | “If you are not a native English speaker, Elsevier has provided language editing service you may wish to consider” |
| | Springer | “Manuscripts written by a non-English language native speaker should be carefully proofed by an |

| | | |
|--|--|--|
| | | <u>Editor whose first language is English before submission”</u> |
| | MDPI | <u>“It is the authors’ responsibility to submit their work in correct English. The APC includes only minor English editing, conducted by native English speakers. ... You may have your work reviewed by an experienced English-speaking colleague...”</u> |
| | Baishideng Publishing Group | <u>“For manuscripts submitted by non-native speakers of English, the authors are required to provide a language editing certificate”</u> |
| Reviewer comments | Anonymous reviewer | <u>“It would be useful to have the article carefully read by a Native English speaker” (21)</u> |
| | Anonymous reviewer | <u>“[T]he paper would benefit enormously from input (either by co-authoring and/or proof-reading) from someone with English as a first language” (32)</u> |
| | Anonymous reviewer | <u>“The authors need a native English-speaking co-author to thoroughly revise the grammar of this manuscript.” (46)</u> |
| Journal editorials, guidelines, and opinions | <i>Nature</i> | <u>“Get a native English speaker to review the writing and provide feedback” (47)</u> |
| | <i>Molecular Biology of the Cell</i> | <u>“Reviewers and editors may also suggest that authors seek the assistance of expert English speakers” (48)</u> |
| | <i>International Journal of Endocrinology and Metabolism</i> | <u>“A native English speaker or a professional language editing service should be employed to improve the readability and convince the reviewer(s)” (49)</u> |
| | <i>Trends in Ecology & Evolution</i> | <u>“[Non-native English speakers’] language skills never reach those of [native English speakers]” (17)</u> |
| | <i>Journal of Management Inquiry</i> | <u>“We cannot ask nonnative speakers of English to produce the level of ‘top’ scholarly output that we expect from our native counterparts.” (50)</u> |

Peer review: bias against research from non-English-speaking regions

Language is intrinsically linked to geographic locations, cultures, religions, and human development (55). These cues may consciously or unconsciously evoke stereotypes, influencing the peer review process in the same way that foreign accents can affect perceptions of credibility (13, 56). This is because, as previously explained (40-42), research from non-English-speaking regions, especially in mid- to low-income countries, is often perceived as lower quality or less prestigious than research from English-speaking regions—similar to the perception of consumer products (57, 58). Such disparities contribute to negative stereotypes about individual research from non-English-speaking, mid- to low-income countries.

For instance, a sample of healthcare professionals and researchers revealed an implicit association between terms denoting high-quality research and wealthy countries and that between terms denoting poor research and less wealthy countries (59). Additionally, a study of

312,740 manuscripts from over 640 journals in the biological sciences found that authors from non-English-speaking regions—and particularly those from countries with a low Human Development Index (HDI) and those in Asia—had significantly poorer review outcomes, such as lower acceptance rates (60). Introducing masked review was found to reduce reviewer biases against research from non-English-speaking regions (61).

Causal evidence of biases comes from experimental studies (62-64). For example, a study involving 347 clinicians from England showed that the perceived importance of an abstract and the likelihood of it being shared with peers increased significantly when its origin was switched from a low- to a high-income country (63). Furthermore, in a randomized controlled trial conducted in 2019, the journal *Functional Ecology* assessed the impact of double-anonymized peer review using real manuscript submissions (64). The study found that authors from English-speaking regions (and from countries with a higher HDI) fared much better than authors from non-English-speaking regions (and from countries with a lower HDI), but only when the author's identity was revealed to reviewers. Implementing compulsory double-masked review is thus critical to dismantling bias in peer review and enabling equitable assessment.

Evidence synthesis: overlooking research published in non-English languages

For various reasons—language barriers, biases in peer review, author choices—many researchers publish their research in non-English avenues. The number of non-English publications is increasing, just like their English counterparts (65). While some non-English papers may include English titles and abstracts, others do not and therefore are undiscoverable in literature searches with English terms—for example, about 20% was undiscoverable in a survey of biodiversity conservation literature published from 1980 to 2018 in 15 non-English languages (65). But even discoverable ones are often ignored in evidence syntheses (e.g., systematic reviews and meta-analyses). For example, in a sample of randomly selected Cochrane intervention reviews, 51% of them did not include non-English publications (66).

Is the neglect of non-English literature in evidence synthesis merely a matter of social justice, or is it a scientific one as well? Omitting relevant data—whether due to language barriers or other reasons—engenders three potential scientific deficiencies: it fails to achieve the *comprehensiveness* necessary for accurate, valid conclusions; it introduces *selection biases* that may distort results; and it perpetuates, however unintentionally, a *hierarchy* of knowledge that marginalizes non-English research.

Specifically, failure to include relevant, non-English research in evidence synthesis can lead to incomplete if not inaccurate conclusions (67). This is particularly acute in fields such as medicine, agriculture, and environmental science, where local knowledge is vital for understanding regional phenomena. For instance, a recent meta-analysis of controlled trials on eye exercises and myopia found 11 eligible studies, with nine in Chinese and only two in English (42). Similarly, analyses of 37 biodiversity reports at the national level found that non-English references constituted, on average, 65% of the references—and they were cited not just because of accessibility but because of their relevance as local knowledge sources (68). Yet international assessments often ignore such non-English science, potentially overlooking important information that could inform and enhance understanding on a global scale (68). Indeed, in global biodiversity conservation, incorporating non-English studies is estimated to expand the geographical coverage by 12% to 25% and the number of species by 5% to 32% (41).

Furthermore, excluding non-English research can lead to selection biases that distort the outcomes in evidence synthesis. For example, negative findings are more likely to be published

in non-English outlets, exacerbating the “file drawer problem” when non-English research is ignored (69, 70). Other factors that may contribute to selection biases include potential systematic differences between English and non-English publications in study characteristics. Indeed, meta-analyses in ecology showed that compared to those incorporating them, excluding Japanese-language studies in some cases resulted in considerable changes in effect sizes—and even their direction (71).

This is not to say that the exclusion of non-English studies will necessarily alter the findings—in many cases, it may not (66)—but the impact of such studies cannot be easily foreseen in individual systematic reviews (40). More generally, by systematically disregarding non-English research, the scientific community perpetuates a hierarchy that privileges certain perspectives while devaluing the contributions from diverse populations and cultures. This practice not only narrows the range of voices heard but also hinders scientific progress and global well-being by ignoring a wealth of knowledge (69). Furthermore, this bias is institutionally reinforced. The widespread use of journal metrics, like the Impact Factor, has contributed to the dominance of English language journals (4). Global rankings and accreditations typically favor English-language publications, creating a self-perpetuating cycle where non-English research is continuously undervalued (48).

Epistemic norms: centering English-speaking participants and regions

Linguistic bias in evidence synthesis is but a symptom of a deeper malaise, one that reflects the underlying epistemic norms. This deeper malaise is rooted in the historical dominance of English in academia, leading to a monocultural lens through which knowledge is interpreted (1). Such epistemic norms center on English-speaking participants and cultures while marginalizing non-English-speaking cultures and knowledge (72), thereby shaping the directions of empirical research and theory construction—and implicitly molding the zeitgeist of collective academic thought.

Thus, quite ironically, in Hyland’s influential paper that deems linguistic injustice a myth, research in English-speaking regions is referred to as the “center,” “Anglophone norms,” “mainstream,” and “global,” and research in non-English-speaking regions as the “periphery,” “location-specific research”/“culture-specific,” “outside,” and “local.” (8) It goes so far as to suggest a key strategy to secure publications in good journals: “Framing the local as global, or as a point of exotic contrast to the centre.” (8)

If knowledge were universal across languages, this English-centric mindset would pose no serious concerns for scientific pursuits—aside from perhaps raising eyebrows among those concerned with social justice. Yet as previously alluded to, language is inextricable from local environments, thoughts, and behavior (43, 55). The presumption that observations from English-speaking samples provide *universal, global* insights into humanity can lead to both *overgeneralizations* of English-originated knowledge and the *marginalization* of knowledge originating in other languages (72). It devalues concerns important to local communities while promoting issues salient in English-speaking samples regardless of wider relevance. Consequently, research programs disproportionately center on questions and measures developed based on English-speaking populations that often lack applicability or meaning outside of those contexts (50). Thus, English-centric norms epitomize linguistic and epistemic injustice (“epistemic imperialism”) that hinders scientific understanding across disciplines, from environmental science and medicine to cognitive science and management.

Two examples from linguistics and communication illustrate these issues. In linguistics, the particular characteristics of English warp research programs by overemphasizing features and mechanisms present in English while ignoring dimensions of diversity encoded in other languages (72-74). For instance, in the English sentence “*She runs in,*” the manner of motion is the primary focus of the verb “*run,*” and the path is a secondary element added through the preposition “*in.*” In contrast, the corresponding Mandarin Chinese, “*她跑进来了,*” treats the path (a compound verb, “*进来*” [come in]) as equally important as the manner (a verb, “*跑*” [run]). Likewise, the corresponding Spanish, “*Ella entra corriendo,*” focuses on the path (a verb, “*entra*” [enter]) instead of the manner of motion (a verb, “*corriendo*” [run]). Thus, lexical bias in English leads linguistics to incorrectly presume that focus on manner of motion is universal, rather than shaped by the language habits of English speakers (75).

Likewise in communications, the British philosopher Paul Grice proposes four rules in conversation—quantity, quality, relevance, and manner—presuming that conversations should be efficient, truthful, relevant, and clear, and that violations imply implicatures. These rules, immodestly called the Gricean maxims, have become reified as cognitive structures for building social robots and AI (76). However, conversational norms in other languages such as Chinese permit and expect deviation from Gricean maxims (24). Efficiency and clarity are often sacrificed for politeness and nuance. Rather than inferring implicatures when these so-called maxims are violated, the violations themselves constitute a standard communicative style in these languages. Social robots guided by the Gricean maxims, then, fail at the design level the communicative expectations of users from diverse linguistic backgrounds.

More generally, because the language we use shapes our ostensibly non-linguistic cognition, including memory, spatial cognition, perceptual biases, decision-making, and social cognition, English-centric biases have caused an underestimation of how integral language is to understanding cognition (72). Indeed, studies involving diverse languages demonstrate considerable variability in numerous domains of cognition traditionally studied with English-speaking samples (10). These findings make it clear that linguistic diversity is not optional if we are to understand the human mind.

Yet, despite calls for linguistic diversity, non-English language contexts often serve merely as data sources to test and extend theories developed in English-language contexts—and phenomena less relevant to English-speaking regions are frequently overlooked or understudied (50). Research typically imposes English linguistic categories and theoretical constructs unsuited to the local context, fostering misrepresentation and dismissing indigenous frameworks for understanding cognition and behavior (19). In the context of health services, such linguistically and culturally ill-fitted interventions can cause more harm than good (77). Conversely, research on non-English-speaking populations, even when addressing issues of local importance, is expected to include qualifiers indicating limited generalizability or to justify its broader relevance to the English-dominated academic discourse—but not the reverse (78). These biases compel many researchers to prioritize phenomena relevant to English-speaking societies while neglecting locally important issues (50). This double standard leads to a systematic loss of knowledge from non-English societies and risks diminishing the relevance of our academic research to the broader community we serve.

Confronting linguistic inequality and linguistic injustice in academic publishing

Linguistic diversity has started to receive more attention (72), but improving linguistic diversity in academic publishing remains challenging (79). On the one hand, regardless of our attitudes, if

we want our research to be read, understood, and built upon, then good writing—writing that is clear, concise, engaging, and even inspiring—is becoming more important than ever (80, 81). This is because our writing competes for attention (82) not only with ever-increasing papers, but also with expanding sources of information and entertainment, from podcasts and videos to social media and AI chatbots. Therefore, slogans like “no paper will be rejected because of poor language” pay lip service to equality and fail to address the underlying issues of writing. For the same reason, lowering the standards for EAL writers may sound inclusive, but it risks undermining the quality of scientific discourse—and it also embodies the soft bigotry of low expectations. On the other hand, as documented in this paper, the hegemony of English does present real structural barriers for EAL researchers, contributing to the marginalization of knowledge originating in non-English languages in global science. The challenge, then, is to create a publishing ecosystem that is linguistically inclusive while upholding the rigorous standards of scientific communication. The framework presented here—linguistic inequality and linguistic injustice—provides a constructive path forward by delineating two distinct issues that require different solutions.

Reducing linguistic inequality by empowering EAL researchers

Proficient academic writing is indispensable for effective scientific communication—critical for both individual career advancement and for enhancing a nation’s scientific competitiveness. Translation services (e.g., writing in the mother tongue first and then translating it into English) may offer short-term aid but do not address the fundamental issue that EAL researchers face: underdeveloped writing skills. They might even become a clutch that researchers depend on. Therefore, in the long run, it is critical to prioritize the development of expertise in academic writing in English. AI tools, particularly large language models (LLMs), present a promising method to empower EAL researchers (and L1 researchers as well) in enhancing their academic writing abilities (83).

By providing personalized feedback in real-time, AI systems enable researchers to identify weaknesses, rectify errors, and progressively understand the subtleties of English academic discourse. When used primarily for indirect assistance, such as coaching, rather than for content generation, AI can facilitate the development of writing skills by requiring researchers to actively implement suggestions to improve their work. This learn-by-doing strategy, supplemented by AI’s unlimited patience and constant availability, fosters the development of writing expertise (84).

Furthermore, by exposing researchers to a variety of writing styles via AI-generated examples and critiques, AI systems can help researchers learn to adapt their writing to different contexts and expectations. Such tailored, personalized training quickens the acquisition of academic writing conventions and empowers researchers to compete at the highest levels. While translation assistance has its place, the focus should be on developing the skills required to produce publishable work.

To address the extra work involved in navigating multiple languages (e.g., translating local materials into English), machine translation tools such as LLMs and services like DeepL and Google Translate can be used to improve efficiency (85). LLMs are particularly promising, but effective prompting techniques are needed for optimal quality and efficiency (86), as offered in **Box 2**. In the long run, open science practices like sharing translation materials online in a centralized depository (e.g., Open Chinese Questionnaires—a fictional name for now) will

improve efficiency for the research community at large. Institutions and incentive structures need to recognize the additional labor of translation in scientific publishing for EAL researchers.

Regarding language-induced inequality in academic training, research, and thinking, a multipronged approach is required. Institutions must invest in developing scientific lexicon and knowledge infrastructure in local languages. Partnerships with commercial entities can also help create user-friendly tools tailored to regional needs and languages. Incentive structures, including promotion criteria and grant awards, should value engaged scholarship that benefits local communities. This includes the high-quality translation of key textbooks and reference materials, as well as the writing of state-of-the-art textbooks and engaging popular science books.

Dismantling linguistic injustice through concerted efforts

Building an inclusive publishing ecosystem further requires that we dismantle the linguistic injustice identified in this article. First, to address the common fallacy that native English speakers are expert writers while non-native speakers are novice writers, journals and publishers should remove language that perpetuates this bias from their instructions and guidelines. Reviewers should be educated about the flaws of this assumption. Editors must be vigilant for implicit biases regarding language use.

Second, to combat biases against research from non-English-speaking regions, journals should implement mandatory double-masked peer review (and triple-masked if editorial triage takes place) (64). Evaluation criteria should focus on scientific merit, not on where the research originated—and training workshops can help increase awareness of prejudices based on language and geographic location. Reviewers and editors can be selected to increase global diversity and reduce biases. To improve linguistic inclusiveness, reviewers are welcome to comment on writing quality but evaluation of writing should be separated from the science (87). Importantly, writing evaluation should be based on clearly articulated criteria (e.g., clarity, conciseness, readability) rather than on perceived language background—and journals should embrace diversity in writing styles (88). Editors should stress these points when sending papers for review.

Third, to incorporate non-English research into evidence synthesis, authors of systematic reviews and meta-analyses should, whenever feasible, search non-English databases and outlets. Authors may use machine translation to identify relevant non-English studies, or, preferably, collaborate with researchers fluent in other languages to facilitate study selection and data extraction (6). Funding agencies should support the extra time and resources required to locate and translate non-English research. The limitations of excluding non-English sources in evidence synthesis should be explicitly acknowledged.

Fourth, to confront English-centric epistemic norms, researchers should explicitly consider perspectives from diverse populations and languages when developing theories and designing studies. Journals could facilitate authors to include multilingual titles and abstracts, highlight research important to non-English communities, and distribute summaries of research in multiple languages (69). Authors of non-English papers may upload their work to repositories with English titles and abstracts (69). Funding agencies should support or mandate translation, particularly for research of global interest or pertaining to non-English-speaking areas (69). Just having linguistically diverse author teams, however, does not necessarily lead to linguistically diverse knowledge synthesis (79)—and the academic community must embrace the importance of indigenous and non-English knowledge to produce more cross-cultural and globally applicable insights.

Box 2. Prompt techniques for scientific translation in LLMs

The following prompts integrate three roles and five steps to translate English texts into Simplified Chinese. They can be adapted to accommodate specific needs, such as decreasing the step count from five to two; displaying the output from the last step only; and changing English and Simplified Chinese to other languages. The URL for the prompts is also available here: <https://chat.openai.com/share/d553a775-a289-4c81-abd4-1e977cab6fc3> (adapted from: <https://baoyu.io/blog/prompt-engineering/three-ai-agents-and-four-steps-flow-prompt>).

Your task is to translate an English scientific article into Simplified Chinese suitable for university students.

RULES:

- When translating, it is necessary to accurately convey the facts and background of the article, while maintaining a style that is easy to understand and rigorous, in the manner of popular science writing.
- Retain specific English terms, numbers, or names, and add a space before and after them, such as “中 IBM 文”, “不超过 1 秒”.
- Even when translating for meaning (“free translation”), special terms (FLAC, JPEG, Microsoft, Amazon, etc.) should be retained.
- Preserve cited references (e.g., [1]) and figures (e.g., Figure 1 should be translated into 图 1).
- Replace full-width parentheses with half-width parentheses, and add a space before the left parenthesis and after the right parenthesis.

There are three ROLES:

- The TRANSLATOR, who is proficient in English, can understand English accurately and express it in Chinese.
- The WRITER, who is proficient in Chinese and excels at writing popular science articles that are easy to understand.
- The EDITOR, who is proficient in both Chinese and English and excels at proofreading and reviewing/editing.

Here are the STEPS to translate the article; each step must follow the RULES above, and print the output of each step:

STEP 1: Play the role of the TRANSLATOR. Translate the original text according to its literal meaning, strictly adhering to the original intent. Maintain the original English paragraph structure during translation—do not combine paragraphs.

STEP 2: Play the role of the WRITER. Reinterpret the content translated by the TRANSLATOR by 1) making it more accessible and in line with Chinese expression habits under the premise of adhering to the original intent, 2) not adding or deleting content, and 3) maintaining the original paragraph segmentation.

STEP 3: Play the role of the TRANSLATOR. But this time translate the WRITER’s draft back into English (back-translation).

STEP 4: Play the role of the EDITOR. Proofread the differences between the back-translation and the original manuscript, focusing on 1) places where the translation and the original differ; and 2) places that do not conform to Chinese expression habits.

STEP 5: Play the role of the WRITER. Revise the draft based on the EDITOR's revision suggestions.

This message only requires a response of OK. I will send you the full content in a subsequent message. After receiving it, please print the translation result according to the RULES above and the FORMAT below. The return FORMAT is as follows, where "{xxx}" represents a placeholder.

1. Translator's Literal Translation

{Results of the TRANSLATOR's Literal Translation}

2. Writer's Draft Interpretation

{Draft Interpretation by the WRITER}

3. Translator's Back-translation

{Back-translation by the TRANSLATOR}

4. Editor's Comments

The following parts are missing in the Chinese translation:

{Repeat the following list until all missing content is listed}

- Comparison of missing or ambiguously expressed parts {1...n}:
 - Original: "{English}"
 - Translation: "{Translation}"
 - Suggestion: {Add new translation or Modify translation}

The following are parts where the Chinese translation does not conform to Chinese idiomatic expression:

{Repeat the following list until all content needing modification is listed}

- Modification {1...n}:
 - Original: "{English}"
 - Translation: "{Translation}"
 - Suggestion: {Modified content}

5. Writer's Final Translation

{Final Translation by the WRITER}

Future directions

Our analysis has highlighted significant linguistic inequality and injustice in academic publishing that demand urgent attention. Moving forward, we highlight some key areas for future endeavors in education, publishing practices, and research. In education, one critical direction is to explore how technology like generative AI can be ethically and productively leveraged in formal

education and training to aid researchers in navigating linguistic barriers while developing core academic writing expertise (83, 84). In particular, how could AI be integrated into traditional writing interventions (e.g., mentoring programs, writing groups) to help researchers strengthen their skills in writing, reviewing, and editing?

In publishing practices, we are missing large-scale audits of journal policies, instructions, and guidelines to identify and amend language that reflects biases against EAL researchers or non-English research. To help dismantle English-centric epistemic norms and to increase the reach and impact of research, we also need to explore ways to make English journals multilingual (e.g., title, abstract) and user-friendly (e.g., non-English versions are displayed only when clicking on an icon).

In research, we urgently need centralized, searchable, and open-access repositories for sharing translated research materials (e.g. questionnaires, scales). Such functions may piggyback on existing repositories by adding multilingual search capabilities and establishing dedicated sections for translations. This would greatly enhance research efficiency and reduce duplication of efforts across languages. To facilitate the cross-pollination of ideas and resources, it is crucial to establish collaborative networks across languages and regions—and future work should explore how such networks can efficiently drive globally relevant research, including on the link between language, cognition, and behavior (89, 90).

Concluding remarks

The dominance of English in academia has led to linguistic inequality and injustice—the elephant in the publishing room. However, efforts to expose and dismantle these issues should not be taken as to undermine the celebration of multilingualism (21). After all, being proficient in multiple languages confers its cognitive and social advantages. EAL researchers possess a wealth of linguistic and cultural experiences that enable them to bridge divides and communicate across contexts. Such multilingualism facilitates cross-pollination of research, broadens perspectives, and fosters creativity.

Furthermore, recent developments indicate growing attention to issues of linguistic diversity (72). More journals are implementing mandatory masked reviews. Leading publishers have introduced formal mechanisms to improve geographic diversity among editorial boards, reviewers, and authors. The UNESCO Recommendation on Open Science advocates for multilingualism and equitable knowledge sharing across languages. These concerted efforts by multiple stakeholders signal a broader awakening to the need for linguistic diversity. Although it is not yet time to open the champagne, we can begin to toast to the future.

Moving forward, beyond implementing formal policies, we must nurture a culture that embraces multilingualism as an asset that enriches global science—a science with global diversity (19). This entails an openness to diverse forms of expression, an appreciation for plurality of perspectives, and a willingness to engage across linguistic and cultural boundaries. After all, our shared progress depends on empowering researchers from all backgrounds to participate in the global quest for understanding. And promoting linguistic diversity will produce more inclusive sciences that harness the full range of human intellectual contributions. With concerted efforts, academic publishing can become a force for cross-linguistic collaboration, rather than an agent in reproducing and reinforcing linguistic inequity. And you, dear reader, are a vital part of these historical efforts.

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