Opening open science to all: Demystifying reproducibility and transparency practices in linguistic research

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# Abstract

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# Introduction - What is open science?

In recent years, numerous fields of research have seen a push for increased reproducibility and transparency practices. These practices, collectively, have been referred to as open science. Parsons et al. (2022) refer to open science as an umbrella term “[…] reflecting the idea that scientific knowledge of all kinds, where appropriate, should be openly accessible, transparent, rigorous, reproducible, replicable, accumulative, and inclusive, all which are considered fundamental features of the scientific endeavor” (p. 11). As a result, specific transparency practices have emerged, such as open access publishing, preregistration, sharing data, analyses, and code, performing study replications, and declaring positionality and conflicts of interest. Though it may come as a surprise to some, these open, transparent research practices have not been the norm in empirical and quantitative sciences.

To properly contextualize the need for open science, one must first consider the so-called reproducibility (replication) crisis (FORRT, 2021). In the early 2010’s, a team of researchers in Psychology embarked on large-scale replication project to scrutinize what many considered to be the fields’ major findings. Specifically, they attempted to replicate 100 influential studies (Open Science Collaboration, 2015). The endeavor produced astounding results—of note, that approximately 53% of the major findings did not replicate—and inspired similar large-scale replication projects in other fields, yielding similar results.[[1]](#footnote-22) This is now referred to as the replication (or reproducibility) crisis. Unsurprisingly, the results generated an uproar in the psychological sciences. The alarming findings garnered media attention (e.g., Oliver, 2016) and have led to periods of introspection and self-reflection in many adjacent fields, among them, linguistics.

Researchers have pointed to questionable research practices (QRPs), such as p-hacking and HARKing, along with small sample sizes, poor theory, lack of transparency, etc. as factors that ultimately led to the replication crisis, though it is likely that many factors are/were simultaneously at play. In the aftermath of the aforementioned crisis, there has been a push for increased transparency and reproducible methodology to help mitigate the effects of QRPs. The resulting methodological framework and associated techniques have reshaped research methods in Psychology, and, slowly but surely, are making their way into related fields. While many agree that open science practices represent a positive step in improving scientific rigor, these practices, by and large, have not been adopted in the field of linguistics (Bochynska et al., 2023). One reason for the slow adoption in linguistics may be related to the fact that engaging in open science is no trivial feat. To wit, it requires learning new skills, thoughtful planning, as well as an openness and willingness to share materials, code, and data. It necessitates that researchers implement new techniques with limited pedagogical resources and embrace alternative methods of disseminating their research, all of which constitutes a steep learning curve. Given how new open science practices are, it is reasonable to assume that current senior researchers were not trained in these innovative methodologies. As a consequence, many early career researchers (ERC) find themselves at a crossroads in which they are forced to learn open science on their own, often without institutional support, at the same time that they are expected to be implementing these novel tools to be successful in their programs/careers.

The present work intends to help make open science practices understandable and accessible to researchers in the speech sciences from all backgrounds and at every stage, from students/ERCs to senior researchers and advisors. To this end, we identify and describe five critical areas in which linguists can engage in open science: open data, positionality statements, preregistration and registered reports, reproducible code/projects, and pre-prints. Specifically, we provide practical examples and detailed descriptions of the aforementioned areas with the goal of helping the interested linguist commence their journey of engaging in open science practices in their own research.

# Positionality statements

A positionality statement is a reflective piece of writing that acknowledges a researcher’s stance, or position, toward a research topic, framework, and even participants. One’s positionality encompasses their social, cultural, and personal identity, as well as their biases and assumptions (Holmes, 2020), and can influence how research is done and how results are interpreted (Rowe, 2014). Among others, relevant personal characteristics that may be included in a positionality statement are gender and racial identity, age, sexual orientation, immigration status, and ideological stances (Berger, 2015). These traits may indirectly impact research endeavors, since participants may be more willing to engage in a study if they perceive the researcher as sympathetic (De Tona et al., 2006), or may even offer different responses based on the researcher’s perceived identity (Berger, 2015).

While positionality statements have been adopted in some disciplines of the humanities and social sciences as a way of recognizing the various ways in which researchers’ backgrounds and identities may intersect with their research endeavors, they are a relatively new incorporation in the field of linguistics, appearing primarily in subfields such as applied linguistics, linguistic anthropology, and linguistic ethnography (Bucholtz et al., 2023). Increasingly, positionality statements are considered crucial components of the research process, as they increase transparency into research practices (Steltenpohl, Hudson, & Klement, 2022) and contextualize the environment in which studies take place, or, in other words, “[define] the boundaries within which research was produced” (Jafar, 2018, p. 1). Traditionally, positionality statements have been more prevalent in qualitative research. We believe they should be considered equally important in quantitative research, since, aside from contributing to ongoing efforts to promote transparency and openness in research practices, recognizing and addressing a researcher’s positionality can increase the validity of their findings (Jafar, 2018). Moreover, Bucholtz et al. (2023) note that considering a researcher’s positionality may be especially important in linguistics, “[…] which relies on racially minoritized communities as sources of data yet lack adequate (if any) representation of those communities among faculty researchers” (p. 2).

Many researchers support and advocate for the inclusion of positionality statements in their research publications (e.g., Bucholtz et al., 2023; Jafar, 2018; Steltenpohl et al., 2022). Nonetheless, others contest this practice, pointing to the universalism of research, that is, the belief that scholarly endeavors should be assessed on their inherent merits, regardless of the status or personal identity of the person making the contribution (Savolainen, Casey, McBrayer, & Schwerdtle, 2023). Savolainen et al. (2023) draw connections between positionality statements and conflict of interest statements, arguing that, while researchers are required to disclose any and all financial gains associated with a research project, “positionality statements grant authors the freedom to decide which parts of their biography they choose to share and how they choose to frame it.” (p. 1334).

While positionality statements, due to their reflexive nature, may encompass larger pieces of writing, they can also take the form of short paragraphs that illustrate a few personal characteristics deemed relevant for the particular research endeavor. For instance, “Gabriela is a white immigrant cis-gender woman from Romania whose research focuses on how non-native speakers are ideologically framed as linguistically deficient in comparison to native speakers characterized by their linguistic authority and expertise.” Lastly, in showing their commitment to Diversity, Equity, Inclusivity, and Belonging (DEIB) initiatives, journals have started to encourage authors to include positionality statements with their submissions (e.g., the Journal of Social and Personal Relationships). It is our stance that researchers should reflect on their positionality before starting a project and consider including a positionality statement. When submitting a study for publication, the positionality statement can be included in additional materials if the word limit is a concern. For examples of positionality statements in linguistic research, the interested reader is direction to Bochynska et al. (2023) and Weissler et al. (2023).

In sum, we believe positionality statements are essential in linguistic research as they promote critical self-reflection, increase transparency, and help address diversity and inclusion concerns. Furthermore, including positionality statements in quantitative research can increase the validity of findings. By reflecting on who it is that does the research, linguistics can become a more diverse, inclusive, and transparent field.

# Open data

The term *open data* refers to data used in research that is freely available to anybody interested in accessing it for any purpose (Knowledge, 2023). In the wake of the reproducibility crisis, the importance of open data in scientific research has grown significantly, particularly in fields like biology, psychology, and linguistics. The underlying motivation for open data is to make knowledge more accessible. It facilitates transparency, rigor, reproducibility, replication, accumulation of knowledge, and makes participating in the scientific endeavor more inclusive.

The case in favor of making data open and accessible is straightforward. Open data practices enable wider access to research information, facilitating validation and replication of studies, which is essential for advancing scientific knowledge and maintaining trust in research findings. Access to open data is key, not just for upholding ethical standards in research, but also for facilitating future scientific progress. Thus, open data becomes a cornerstone for researchers striving to make meaningful contributions to their fields and the broader scientific discourse.

Researchers may initially hesitate to share their data publicly, but gaining an understanding of the benefits of open data can help alleviate these concerns. It is important to note that simply stating “data available on request” is not sufficient to meet the new current standards of effective data sharing (Wicherts, Borsboom, Kats, & Molenaar, 2006). Effective data sharing has to involve a more comprehensive and transparent approach, ensuring that data is readily accessible to other researchers and contributing to the broader scientific community’s efforts.

Open data benefits individual researchers, the broader research community, and society as a whole. By sharing data, researchers enhance their visibility and credibility, paving the way for academic collaborations and establishing their work as a cornerstone within their field.

Gone are the days of “data available upon request”, which generally does not result in adequate sharing of research materials (Spellman, Gilbert, & Corker, 2017; Wicherts et al., 2006), as many journals have begun to strongly encourage that researchers make publicly available some version of their data (e.g., *Language Learning*).

Firstly, data storage is a critical aspect that researchers must prioritize, focusing on its longevity and accessibility. Some researchers find it beneficial to include all study materials and anonymized data on their project page throughout their research, while others prefer to use the project page solely for final documents. There is also the option to organize a project using various cloud-based storage providers, such as Google Drive, Dropbox, or Box, which can link directly to your computer. Many of these providers offer the added convenience of integrating directly with an OSF project, allowing researchers to enjoy the advantages of both systems. This method helps balance the risks of technological failure and privacy concerns. The Open Science Framework (OSF) also provides free, open-source solutions for different research processes (Foster & Deardorff, 2017; Nosek et al., 2022), ensuring secure and accessible data storage.

Additionally, the development of tools like Git and GitHub has transformed scientific development in the open-data domain. These platforms facilitate collaborative efforts and enhance user engagement, revolutionizing the way research is conducted and shared.

Narrowing the field of open data to focus specifically on linguistics offers significant benefits. For example, it enhances the study of diverse and underrepresented languages. By making linguistic data from minority communities publicly available, we enable wider access and collaboration. This allows researchers to document and study linguistic elements that might otherwise be overlooked. The approach not only aids in preserving endangered languages but also fosters a more inclusive and comprehensive understanding of the global linguistic landscape.

That being said, the field of linguistics faces unique challenges with regard to open data. There are ethical considerations that must be considered with care. The privacy and consent of participants must be safeguarded, particularly in projects involving sensitive or personal data. This might be particularly challenging in cases of audiovisual sociolinguistic interviews but probably easier to share in phonetic studies, for example.

Though not exhaustive, we now consider some possible solutions to the unique problems linguistics faces. The responsibility encompasses several key aspects: anonymizing data to protect individual privacy, obtaining informed consent to ensure participants are aware of how their data will be used, and being culturally sensitive to respect the diverse backgrounds of participants. All these steps need to be aligned with legal standards. The PI’s goal is to make data as open as possible while carefully balancing the need for openness with the imperative to respect privacy and legal constraints. This approach is vital for maintaining the ethical integrity of the research and safeguarding the rights of participants.

In summary, open data is fundamental to advancing scientific excellence and ensuring transparency. It elevates collaboration, bolsters credibility, and improves access to knowledge. While embracing open data, ethical considerations necessitate data anonymization and privacy safeguards. The efficacy of data sharing hinges on clear and transparent storage practices. Innovations in this domain, facilitated by platforms like the Open Science Framework and tools such as Git, have revolutionized data sharing in the academic sphere. Open data brings numerous benefits: it underpins reproducibility, minimizes redundant efforts in research, and demystifies complex academic concepts for the general public. For the research community and society at large, the adoption of open data practices is not just beneficial but essential for responsible research and continued academic advancement.

# Reproducible code/projects and literate programming

Reproducibility is a crucial aspect of any scientific study, and it has become increasingly important in recent years. Researchers must be able to provide a clear and transparent account of their findings, including the methods used to obtain them. Reproducibility can help to ensure that research results are valid, reliable, and can be used by others to build on existing knowledge. In this section, we explore the importance of reproducibility, what we know about it in the fields of psychology and linguistics, and how researchers can make their code and projects more reproducible.

In general, it helps to increase the credibility of research findings and allows other researchers to verify and build on existing work. At worst, a lack of reproducibility can lead to irreproducible results and wasted resources. This can have serious implications for public health and policy decisions based on research findings.

In order to ensure reproducibility, it is necessary to be transparent about the methods used in research. This includes not only the data collection and analysis methods but also the code used to conduct the analysis. In the fields of psychology and linguistics, there is increasing awareness of the importance of reproducibility, and many researchers are taking steps to improve the transparency of their research.

Researchers have an ethical responsibility to make their code and projects reproducible. There are several steps that researchers can take to make their code and projects more reproducible. One approach is to create reports that document the research process, including the data used, the methods used to analyze the data, and the results obtained. This documentation can then be used to reproduce the research findings.

Another approach is to create reproducible projects. These projects include all of the data, code, and documentation necessary to reproduce the research findings. This approach makes it easier for others to reproduce the research findings and build on the work.

Dependency management tools like renv and targets can also be helpful in ensuring reproducibility. These tools help to manage the dependencies that are necessary to run the code and ensure that the code can be run on different systems. Computational reproducibility platforms like Binder and Code Ocean can also be used to ensure reproducibility. These platforms allow researchers to share their code and data in a way that can be easily replicated by others.

It is important to note that there is no way to future-proof code or projects. Researchers must continually work to maintain the reproducibility of their work. This includes updating the code and documentation as needed and testing the code on different systems to ensure that it can be run in different environments.

In conclusion, reproducibility is a crucial aspect of scientific research. It helps to ensure that research findings are valid, reliable, and can be used by others to build on existing knowledge. In the fields of psychology and linguistics, there is increasing awareness of the importance of reproducibility, and many researchers are taking steps to improve the transparency of their research. By creating reports, reproducible projects, and using dependency management tools and computational reproducibility platforms, researchers can make their code and projects more reproducible.

# Preregistration and registered reports

In this section, we will briefly consider two open science innovations that are making a profound impact on how academic research is conducted, evaluated, and, ultimately, disseminated to the public. These innovations, preregistrations and registered reports, were designed with the goal of reducing QRPs and publication bias.

## Preregistration

A preregistration is a time-stamped document that provides comprehensive detail about a study, including, but not limited to, research questions, hypotheses, methodologies, and analytic strategies. Preregistrations are written prior to data collection and do not undergo peer review. The depth of content detail within a preregistration spans a spectrum: in the simplest case, a preregistration can comprise merely a hypothesis or perhaps a brief description of the methods; on the other extreme, a detailed preregistration can include code, power analyses, participant exclusion criteria and beyond. In this section, we provide information regarding the various components of a preregistration, centering on their advantageous impact on linguistic research. Specifically, we focus on *who* might want to consider preregistrations, *why* they might want to do so, *what* content they can include, and *how* they can complete a preregistration for a linguistics research project.

Linguists engaged in empirical studies delve into data collection and observations to explore various dimensions of human language. These investigations span diverse areas such as corpus analysis, interview analysis, experimental analysis, and more. However, as highlighted by Roettger (2021), researchers are human and humans have evolved to filter the world in irrational ways, which can lead to QRPs and other problems that may affect the replicability of published research. Preregistration emerges as a powerful instrument empowering linguists to bolster the trustworthiness and credibility of their inquiries through a systematic and predefined methodology. Moreover, the practice of preregistration extends its benefits to researchers at all levels, including students and ECRs, senior academics, and professionals alike.

Researchers face vital decisions while designing and executing research, with an inherent flexibility involved in the process of designing and conducting the experiment, and in analyzing the results (Simmons, Nelson, & Simonsohn, 2011). This type of flexibility, termed “researcher degrees of freedom”, can have serious down-stream consequences in quantitative research []. For instance, envision a phonetician intrigued by exploring lexical stress. In this scenario, the researcher might concentrate on distinct acoustic markers linked with stress, like pitch, duration, and/or intensity. Beyond selecting which acoustic markers to assess, they must pinpoint the specific realm for these measurements. Does it encompass the nucleus of stressed/unstressed syllables or the entirety of the syllable? Where exactly does the measurement occur—at the midpoint or as an average across the entire syllable? These choices wield significant influence on subsequent analyses. Preregistration serves the purpose of meticulously documenting these crucial facets of the study. Moreover, preregistration acts as a deterrent against QRPs, like HARKing or p-hacking, by mandating explicit declaration of decisions in the research trajectory before any data collection commences. Preregistering also acts as substantiation that researchers are conducting confirmatory rather than exploratory data analysis by delineating a clear chronology of decisions made before and after data collection. Additionally, an enhanced level of specificity in the preregistration compels researchers to consider facets of their study that might usually be deferred to a later stage, such as statistical analyses. This proactive approach demands more initial time investment from the researcher, but significantly enhances the prospects of uncovering pivotal flaws in the study design.

The scope of preregistration extends to any facet of research deemed worthy of temporal documentation preceding the initiation of the study, and the essential components predominantly include Research Questions/Hypotheses, Methodological Framework, and Analytical Approaches. The specific elements that will encompass a preregistration document will appear to be considerably diverse, but depend on the specific domain within linguistics and the nuanced nature of the study in question.

An example illustrating this variability is as follows. Consider the scenario where a psycholinguist is poised to undertake an experiment utilizing the self-paced reading methodology. In this context, the focus of the preregistration would logically revolve around pivotal aspects, including explanations of research inquiries, formulation of hypotheses, and meticulous delineation of methodological intricacies. This encompasses characterization of participant demographics, recruitment strategies, sample size considerations, and analogous critical details. Additionally, the psycholinguist may find it imperative to explain the notable variables subject to manipulation within the experimental design, articulate planned data transformations, and analyze the chosen statistical modeling strategies for subsequent inferential analyses. Not all of the aforementioned components are equally prioritized in a preregistration.

It is important to acknowledge that incorporating the entirety of these components into a preregistration may be a formidable challenge, particularly if open science is a new endeavor for the researcher. In such instances, a judicious approach is permissible, with researchers encouraged to commence with elements they perceive as most valuable to their study. Over time and through iterative practice, researchers will gain a better discernment of relevance within the Open Science framework.

Many concerns regarding the implementation of Open Science or adopting preregistration revolve around the potential burden of ‘extra work’. Conversely, preregistration is intended to streamline our workflow, fostering efficiency both in the short term and the long run. Moreover, it offers complete control over the level of detail one chooses to include. The depth of preregistration directly correlates with the effort invested; the more comprehensive the preregistration, the greater the initial workload, leading to reduced effort in subsequent stages (See [Figure 1](#fig-detail)).

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| Figure 1: Select levels of detail as suggestions to help gauge the extent of information to incorporate into a preregistration. The shading indicates the degree of detail; darker shades imply more exhaustive information (thus requiring more upfront work). |

## Registered reports

The reproducibility crisis has drawn attention to the shortcomings of the traditional model of publishing scientific research. In the current model, researchers generate hypotheses, design studies, collect data, analyze data, interpret results, and submit their findings for publication. However, this model has been criticized for lending itself to QRPs, such as p-hacking and harking, which can result in publication bias.

To address these issues, researchers have attempted various reforms, such as meta-analysis and pre-registration. Meta-analysis is a statistical technique that combines the results of multiple studies to increase the power of analysis. Preregistration, as we have seen, involves publicly registering a study’s design and methods before collecting data, to mitigate QRPs.

Registered Reports (RRs) represent a new model that conceptually combines preregistration with peer review. In this model, researchers submit a detailed proposal of their study, including their hypotheses, methods, and analyses, for review before data collection. If the proposal is accepted, the study is guaranteed publication, regardless of the results. This incentivizes rigorous methodology and reduces QRPs, as researchers cannot manipulate their analyses to obtain significant results.

RRs were first introduced in 2013 by the Center for Open Science (COS), and have since been adopted by many journals across various fields, including psychology, neuroscience, and medicine.

Pre-registration is often confused with RR, but they differ in that pre-registration is a separate step that occurs before the traditional publishing pipeline, whereas RR is integrated into the publishing process. RRs cannot solve all the problems with the current model, but they can help reduce QRPs and increase transparency in scientific research.

RRs are gaining popularity, but some fields, such as linguistics, have been slow to adopt them. RRs may particularly benefit ECRs, who can use them to increase their chances of publication and build a reputation for rigor. However, more senior researchers may be resistant to change and may need to be convinced of the benefits of RRs for the field as a whole.

In sum, registered reports represent a promising new model for publishing scientific research that can help reduce QRPs and increase transparency. As more journals adopt RRs, the scientific community can move towards a more rigorous and trustworthy publishing model.

# Pre-prints

In recent years, the concept of open science has gained traction in academic circles. The idea behind open science is to make scientific research and data more accessible, transparent, and reproducible. One of the ways in which open science is being promoted is through the use of pre-prints.

## What is a pre-print?

A pre-print is a version of a research article, open and accessible, that has not yet undergone peer review but is publicly available online, through a pre-print server. The general process consists of an initial screening process, followed by a posting of the manuscript on the preprint server within a few days of submission, bypassing peer review, and making the research findings freely accessible online (Puebla, Polka, & Rieger, 2021). Pre-prints allow researchers to share their findings with the scientific community and get feedback before their work is published in a traditional academic journal. This process can speed up the dissemination of knowledge and facilitate collaboration between researchers. While pre-prints accelerate the dissemination of research, it is vital to remember that this process does not always lead to journal publication. This can occur for several reasons, such as authors may choose not to pursue this route, or the research may be intended for different dissemination avenues (Ettinger et al., 2022). Pre-prints have become increasingly popular in recent years, particularly in fields such as biology, physics, and computer science. The adoption of pre-prints has been slower in some fields, such as the social sciences and humanities, but this is changing as more researchers become aware of the benefits of open science, and new national and regional platforms by open science advocates continue to emerge.

## What are the benefits of pre-printing?

One of the primary benefits of pre-prints is that they allow researchers to share their findings quickly and easily. This can be especially important in fields where research moves quickly, such as biology or computer science. Pre-prints also allow researchers to receive feedback on their work from their peers, which can help to improve the quality of their research. The provision of commentary and reviews of pre-prints yields benefits not only to the authors but also extends support to the authors, but this process also supports reviewers, journals and publishers, and the reader audience. This inclusive process allows more researchers and reviewers to participate in discussing the research findings and reduces the need for repeated rounds of re-review or extensive revisions.

One of the most significant benefits of pre-prints is their “early view” and “open access” effect, which leads to more attention from readers, increasing visibility and development of the overall research (Das Biswas & Biswas, 2023). Pre-prints are not just quick dissemination; they also promote transparency and reproducibility in scientific research. Recognizing these benefits, more major publishers have either launched preprint platforms or entered partnerships over the past 5-7 years, allowing preprints to be incorporated into the workflow (Puebla et al., 2021). By making research findings available to the public before peer-review, pre-prints not only improve the accuracy and reliability of research findings but also encourage collaborative efforts to identify potential errors, refine methodologies, and accelerate knowledge dissemination.

Another benefit of pre-prints is that they can help to reduce publication bias, a widespread challenge in traditional publishing. Publication bias occurs when positive results are more likely to be published than negative results. This can skew the scientific literature and lead to a misunderstanding of the state of the research. Pre-prints address this obstacle by openly sharing all research findings, regardless of outcome, creating a fairer and more accurate representation of the current scientific landscape of that field.

## Why the hesitation to pre-print?

Despite these benefits, some researchers remain hesitant to use pre-prints. One concern is that publishing a pre-print may harm their chances of being published in a traditional academic journal. However, this concern is becoming less relevant as more journals are accepting pre-prints as a legitimate form of publication. According to Liu & De Cat (2021), who conducted a survey asking as to the barriers in sharing preprints and discovered that the following were raised as additional barriers: peer review, journal policy, lack of knowledge of the process, confidentiality issues, data types, utility of sharing preprints, time constraints, and issues in preprint management.

One of the concerns about preprints is their ability to secure the steady resources (technologies, expertise, policies, visions, standards, and so on) required to maintain and enhance the value of a service based on a user community’s needs (Rieger, 2012). Preprints emerged as a ‘public good’ and preprint platforms provide a free service to both authors and readers; at the same time, many of the existing preprint services lack a scalable and transparent business model.

Additionally, data shows that more senior researchers had more experience sharing through the format of preprint than PhD students and early-career researchers in the 0-4 years group (Liu & De Cat, 2021). However, the data collected from these surveys showed positive attitudes and willingness to contribute to open science through the submission of pre-prints. These findings encourage early-career researchers to submit their research for pre-prints to receive valuable feedback from established scholars in their field of study and to increase visibility of their research, particularly in rapidly evolving fields.

## What is the process to pre-print?

First, select your pre-print server that aligns with your course of research. Next, all pre-prints undergo a short screening, confirming author background, basic research content, and compliance with the ethical standards of the pre-print platform. Once pre-prints pass the screening process, the content is made available online in open access format, encouraging others to comment and share. To learn more about the various methods for preparing linguistic data for archiving and sharing, Thomason (2022) shares more on Open Handbook of Linguistic Data Management.

In conclusion, the growing visibility of pre-prints, and their acceptance as valid research outputs by diverse stakeholders, including researchers, funders, and national institutions, has fueled collaborative research efforts and strengthened support for their presence in a variety of research disciplines. Pre-prints play an important role in advancing the tenets of open science by promoting transparency, reproducibility, and collaboration. While some researchers may still be hesitant to use this dissemination paradigm, the benefits of open science are becoming increasingly clear. By embracing pre-prints, researchers can accelerate the dissemination of knowledge, improve the quality of research, and ensure that their findings are available to the widest possible audience.

# Conclusion

The purpose of this article is to help foster open science in linguistics (FOSIL). The early 2010’s saw the reproducibility crisis take hold of the psychological sciences. As a consequence, there has been a push for increased transparency and reproducible methodology to help mitigate the effects of questionable research practices. The resulting methodological framework and associated techniques, now referred to as open science, have reshaped research methods in psychology and have slowly but surely made their way into adjacent fields, such as linguistics. Important considerations often overlooked in the wake of the open science movement deal with (1) how linguists actually learn open science practices and (2) how senior researchers can train the next generation of linguists. Few, if any, researchers have had explicit instruction on the practices of open science as part of their professional training. Nonetheless, today’s speech researcher is expected to be up to date on the current protocols of open science in order incorporate the methodological practices aimed at improving reproducibility/replicability. The FOSIL project aims to make open science practices clear and accessible to people conducting research in the field of linguistics.

# References

Berger, R. (2015). Now I see it, now I don’t: Researcher’s position and reflexivity in qualitative research. *Qualitative Research*, *15*(2), 219–234. <https://doi.org/10.1177/1468794112468>

Bochynska, A., Keeble, L., Halfacre, C., Casillas, J. V., Champagne, I.-A., Chen, K., … Roettger, T. B. (2023). Reproducible research practices and transparency across linguistics. *Glossa Psycholinguistics*, *2*(1, 18), 1–36. <https://doi.org/10.5070/G6011239>

Bucholtz, M., Campbell, E. W., Cevallos, T., Cruz, V., Fawcett, A. Z., Guerrero, B., … Reyes Basurto, G. (2023). Researcher positionality in linguistics: Lessons from undergraduate experiences in community-centered collaborative research. *Language and Linguistics Compass*, *17*(4), 1–15. <https://doi.org/10.1111/lnc3.12495>

Camerer, C. F., Dreber, A., Forsell, E., Ho, T.-H., Huber, J., Johannesson, M., et al.others. (2016). Evaluating replicability of laboratory experiments in economics. *Science*, *351*(6280), 1433–1436. <https://doi.org/10.1126/science.aaf091>

Camerer, C. F., Dreber, A., Holzmeister, F., Ho, T.-H., Huber, J., Johannesson, M., et al.others. (2018). Evaluating the replicability of social science experiments in nature and science between 2010 and 2015. *Nature Human Behaviour*, *2*(9), 637–644. <https://doi.org/10.1038/s41562-018-0399-z>

Das Biswas, M., & Biswas, A. (2023). Open access to scholarly communication through preprints: Accelerating sustainable development in education. In D. Coghlan & M. Brydon-Miller (Eds.), *Digital libraries: Sustainable development in education* (pp. 525–545). National Digital Library of India, IIT Kharagpur.

De Tona, C. et al. (2006). But what is interesting is the story of why and how migration happened. *Forum: Qualitative Social Research*, *7*(3), 1–12. <https://doi.org/10.17169/fqs-7.3.143>

Errington, T. M., Mathur, M., Soderberg, C. K., Denis, A., Perfito, N., Iorns, E., & Nosek, B. A. (2021). Investigating the replicability of preclinical cancer biology. *Elife*, *10*, e71601. <https://doi.org/10.7554/eLife.71601>

Ettinger, C. L., Sadanandappa, M. K., Görgülü, K., Coghlan, K. L., Hallenbeck, K. K., & Puebla, I. (2022). A guide to preprinting for early-career researchers. *Biology Open*, *11*(7), 1–8. <https://doi.org/10.1242/bio.059310>

FORRT. (2021). Reproducibility crisis (a.k.a. Replicability or replication crisis). Retrieved from <https://forrt.org/glossary/reproducibility-crisis-aka-replicab/>

Foster, E. D., & Deardorff, A. (2017). Open science framework (OSF). *Journal of the Medical Library Association: JMLA*, *105*(2), 203.

Holmes, A. G. D. (2020). Researcher positionality–a consideration of its influence and place in qualitative research–a new researcher guide. *Shanlax International Journal of Education*, *8*(4), 1–10. <https://doi.org/10.34293/education.v8i4.3232>

Jafar, A. J. N. (2018). What is positionality and should it be expressed in quantitative studies? *Emergency Medicine Journal*, *35*(5), 323–324. <https://doi.org/10.1136/emermed-2017-207158>

Knowledge, O. (2023). The Open Definition. Retrieved from <https://opendefinition.org>

Liu, M., & De Cat, C. (2021). Open science in applied linguistics: A preliminary survey. In L. Plonsky (Ed.), *Open science in applied linguistics* (pp. 1–28). John Benjamins.

Nosek, B. A., Hardwicke, T. E., Moshontz, H., Allard, A., Corker, K. S., Dreber, A., et al.others. (2022). Replicability, robustness, and reproducibility in psychological science. *Annual Review of Psychology*, *73*, 719–748.

Oliver, J. (2016). Scientific studies: Last Week Tonight with John Oliver. Retrieved from <https://youtu.be/0Rnq1NpHdmw?si=6tIMWkEbOY47rhaE>

Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. *Science*, *349*(6251), aac4716. <https://doi.org/10.1126/science.aac4716>

Parsons, S., Azevedo, F., Elsherif, M. M., Guay, S., Shahim, O. N., Govaart, G. H., et al.others. (2022). A community-sourced glossary of open scholarship terms. *Nature Human Behaviour*, *6*(3), 312–318. <https://doi.org/10.1038/s41562-021-01269-4>

Puebla, I., Polka, J., & Rieger, O. Y. (2021). *Preprints: Their evolving role in science communication*. MetaArXiv. <https://doi.org/10.31222/osf.io/ezfsk>

Rieger, O. Y. (2012). Sustainability: Scholarly repository as an enterprise. *Bulletin of the American Society for Information Science and Technology*, *39*(1), 27–31. <https://doi.org/10.1002/bult.2012.1720390110>

Roettger, T. B. (2021). Preregistration in experimental linguistics: Applications, challenges, and limitations. *Linguistics*, *59*(5), 1227–1249. <https://doi.org/10.1515/ling-2019-0048>

Rowe, W. E. (2014). Positionality. In D. Coghlan & M. Brydon-Miller (Eds.), *The SAGE encyclopedia of action research* (pp. 627–628). Sage.

Savolainen, J., Casey, P. J., McBrayer, J. P., & Schwerdtle, P. N. (2023). Positionality and its problems: Questioning the value of reflexivity statements in research. *Perspectives on Psychological Science*, *18*, 1331–1338. <https://doi.org/10.1177/17456916221144988>

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, *22*(11), 1359–1366. <https://doi.org/10.1177/0956797611417632>

Spellman, B., Gilbert, E., & Corker, K. S. (2017). *Open science: What, why, and how*. <https://doi.org/10.31234/osf.io/ak6jr>

Steltenpohl, C., Hudson, S., & Klement, K. (2022). How to begin writing a positionality statement. Retrieved from <https://vimeo.com/675236573/741e24aab7>

Thomason, S. G. (2022). *The open handbook of linguistic data management*. MIT Press.

Weissler, R., Drake, S., Kampf, K., Diantoro, C., Foster, K., Kirkpatrick, A., … Baese-Berk, M. M. (2023). Speech perception and production lab: Positionality statements. Retrieved from <https://www.speechperceptionproductionlab.com/positionalitystatments>

Wicherts, J. M., Borsboom, D., Kats, J., & Molenaar, D. (2006). The poor availability of psychological research data for reanalysis. *American Psychologist*, *61*(7), 726. <https://doi.org/10.1037/0003-066X.61.7.726>

1. For Economics, see Camerer et al. (2016); for the Social Sciences, see Camerer et al. (2018); and, for cancer research, see Errington et al. (2021). [↑](#footnote-ref-22)