

The first author takes it all? Solutions for crediting authors more visibly, transparently, and free of bias

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Abstract

With the seventh edition of the publication manual of the American Psychological Association (APA), the APA style now prescribes bias-free language and encourages accessibility even to non-academic audiences. However, even with the newest guidelines, the way we credit authors in psychology remains anachronistic, intransparent, and prone to conflict. It still relies on a sequence-determines-credit approach in the byline, which concurrently is contradicted by the option to consider the last author as the position of the principal investigator depending on the field or journal. Scholars from various disciplines have argued that relying on such norms introduces a considerable amount of error when stakeholders rely on articles for career-relevant decisions. Given the existing recommendations towards a credit-based system, ignoring those issues will further promote bias that could be avoided with rather minor changes to the way we perceive authorship. In this article, we introduce a set of easy-to-implement changes to the manuscript layout that value contribution rather than position. Aimed at fostering transparency, accountability, and equality between authors, establishing those changes would likely benefit all stakeholders in contemporary psychological science.

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authorship, citation style, credit, publication, transparency

INTRODUCTION

If scientists want to convey this information [an author's contribution] by the way their names are ordered, the method is similar to sending smoke signals, in code, on a dark, windy night.

Drummond Rennie (cf., Venkatraman, 2010)

Publications increase an author's prestige. This, in turn, can be a decisive aspect for the researcher's further career. A certain number of publications attributed to an author may determine the weal and woe of getting hired, promoted, or funded at all. Consequently, authorship is often referred to as the currency of science. This currency is often quantified by single number metrics such as the number of publications or the h-index (Hirsch, 2005). However, such indices usually represent only bibliometric dimensions (i.e., the quantity of one's involvement in research) and thus are not suitable to transparently inform about an individual's contribution or competences (Herb, 2015). Meanwhile, Open Scholarship has become an important part of modern psychological science, meaning that scientists have dedicated themselves to “improve openness, integrity, social justice, diversity, equity, inclusivity and accessibility” (Parsons et al., 2022, p. 3). In this vein, one might argue that conducting open and transparent research not only requires transparent practices but also requires indicating more clearly which author contributed in which manner to a scientific output. Obviously, this requires more than putting a number to a name.

In addition to numeric metrics that measure the quantity and dissemination of an author's work on the scale of published articles, psychological science has settled for a complementary logic that determines an author's contribution within a single article, which is the order of the byline. While problems and pitfalls associated with the (over-)reliance on quantifications of publication output have received a lot of critical attention from various research communities (e.g., Bi, 2022; Frith, 2020), scientific discussions about drawbacks of norms using author order as a proxy of author contribution are scarce in contemporary psychological literature. In this article, we argue that a reliance on such norms can also counteract open scholarship and equality among authors and propose solutions to remedy the current situation. For this purpose, we first outline issues related to these conflicting and outdated credit norms from both, a theoretical and a practical (social) psychological perspective. We then show how easy-to-implement changes to the manuscript layout centered around contribution systems (such as CRediT, the Contributor Roles Taxonomy; Allen et al., 2014) can effectively solve these problems and ultimately promote three cornerstones of open scholarship, namely transparency, accountability, and equality. Finally, we address potential concerns and limitations related to our proposal and highlight how researchers, publishers, editors, and funders would benefit from the proposed changes.

Authorship – a (social) psychology topic

In the psychological sciences, the American Psychological Association (APA) publication manual (American Psychological Association, 2019) represents the leading guideline for preparing manuscripts. From its very origins, the APA style has been a direct response to the needs of the psychological community (Sigal & Pettit, 2012). With the recent release of the 7th revision of the APA-Style (American Psychological Association, 2019), psychology took a step towards fostering transparency and bias-free language within their manuscripts in response to an ever-growing psychological

community which is as diverse as never before. Yet, at the same time, the recommendations for disclosing author contributions in psychology remain the same as they have been for almost a hundred years since the first APA guideline was published (Bentley et al., 1929). These recommendations cause vagueness by promoting two contradicting norms for ordering authors in the byline in contemporary psychology.

Firstly, the author's names are supposed to be ordered in a manner that is intended to represent the "relative contribution" of each individual contribution to the research outcome. This means that the author with the largest contribution to the outcome shall be listed first, while the author with the smallest contribution shall be listed last. What the manuscript guidelines suggest here is referred to as the *sequence-determines-credit* (SDC) approach (Tscharrntke et al., 2007). Secondly, however, and in clear contrast to the SDC approach, the APA manual also mentions the option to reserve the last author position for another principal contributor (American Psychological Association, 2019). In several disciplines, this last author position appears to be favoured by senior researchers (Strange, 2008) and scholars have argued that, despite differences between labs and subfields, this spot is usually reserved for the principal investigator (Odic & Wojcik, 2020). This establishes a second rule, contradicting the SDC by reevaluating that last position, forming a *first-last-author-emphasis* (FLAE) norm (Tscharrntke et al., 2007). The existence of contradictory rules already defies the goal of providing a transparent recommendation to disclose the authors' contributions or as Tscharrntke et al. (2007) put it: "One really does not know if being the last author means that the overall contribution was the most or least important" (p. 13).

In the modern scientific world, a simplistic approach such as ordering by the magnitude of contribution increasingly loses its heuristic validity. With the rising complexity of methods, interdisciplinary and large-scale cooperations become more and more important and might be especially fruitful when different scientific approaches and expertise are combined (Pavlidis et al., 2014). Thus, scholars might seek collaborations based on the need of certain key skills (e.g. expertise in certain data analysis methods). Such skills might be complementary, yet of equal importance for the success of a project. This complicates the process of assigning authorship because relative importance is hard to determine between different parts of a scholarly output. Although the SDC approach guides the decision process via assigning credit by order, it is unclear what margin or what contribution differentiates between the first, the last, and all remaining co-authors (Helgesson & Eriksson, 2019). While responsibilities within the scientific process may be validly weighted and ordered (Venkatraman, 2010; Winston, 1985), contributions will most likely be too unequally distributed among all authors to be adequately reflected by the author sequence alone. Furthermore, even though the skills of co-authors might be pivotal to the success of research projects, such key contributions must inevitably be disregarded by committees due to a ubiquitous lack of transparency in the authorship order. Conversely, first authors might not bear the key expertise on the topic of the manuscript and yet receive the most credit for publishing the article. Consequently, determining credit only by order can be considered a heuristic at best, or as Strange (2008) hyperbolized in his headline: "Authorship: why not just toss a coin?"¹

In practice, the emphasis on first and last author also leads to a devaluation of middle authors, whose numbers have considerably increased since the early days of psychology, a trend that has already been observed in the 1950s and the 1980s (Mendenhall & Higbee, 1982; Smith, 1958). Today, on average, two to three authors remain only vaguely credited on a publication. At the same time, large-scale psychological research projects like the Many Labs Studies (Klein et al., 2018), studies from the Psychological Science Accelerator (PSA; Moshontz et al., 2018), and knowledge-generating community efforts like a community-sourced Open Scholarship Glossary (Parsons et al., 2022) or the Open Scholarship Knowledge Base (OSKB; <https://www.oercommons.org/hubs/OSKB>) foster the notion that the future of reliable, valid, and all-agreed psychological findings may lie in

¹Alternatively, we could also follow the example by Simmons et al. (2011, p. 1365): "Author order is alphabetical, controlling for father's age (reverse-coded)".

aggregating as much expert knowledge and helping hands as possible. With the value of big team science on the horizon (Forscher et al., 2020) and the vagueness of the byline at hand, we conclude that the current metrics, heuristics and formal practices do not sufficiently promote the principles of Open Scholarship.

Additionally, taking the standpoint of a social psychologist, crediting authors is to some extent a negotiation process within a group of researchers. Thus, it is prone to biases and antecedences fostering biases in authorship prevalent in group settings. One such antecedence are power asymmetries (e.g., Schaerer et al., 2020) and differences in prestige as a proxy for these power asymmetries. Power asymmetries and differences in prestige are common in research projects, for example between eminent principal investigators, more senior researchers, and early career researchers (ECRs). Thus, the space of negotiation pertaining to authorship comes with risk that especially ECR's lack of power and experience is exploited (Rennie et al., 1997) as ECRs are the most vulnerable party during authorship discussions.

Given the usually unquestioned power that academic supervisors possess over their subordinates, ECRs can hardly hope to oppose any opinion of their superiors without facing the fear of being penalized (Bartlett & Mercer, 2000). This is especially worrying because most ECRs (and especially PhD students) depend on their supervisors' resources. They are likely to work on fixed-term contracts and might not have accumulated enough scientific output to acquire their own funding. Consequently, the byline of an ECR's article might be more tailored towards a supervisor's subjective standards than the consensus of the author consortium. In this vein, dependent contributors might also need to spend time and energy on competing about an earlier byline position with other researchers (Nicholas et al., 2017) or could feel forced to grant gifted authorships to other researchers.

Similarly, in light of the FLAE norm, diffusion of responsibility (Fischer et al., 2011) and social loafing (Karau & Williams, 1993) might be facilitated especially among middle authors. Moreover, individual biases such as the Mere Exposure Effect (Zajonc, 1968; Zajonc, 2001; in the realm of authorship, referring to the higher visibility of the first author compared to the other authors) which is fostered by the perceptual context of research literature (i.e., visual stimuli and typical exposure durations of less than 10s; Montoya et al., 2017) likely lead to the overestimation of the contribution of the first author to the research project as a whole. This is especially problematic in shared first-authorships as often only the author actually in the first position is visible (Rose-Clarke & Fellmeth, 2019).

Furthermore, the notion, that overrepresenting first author names in the literature and scientific communication has been backed by the discovery of a considerable correlation between first author surnames and academic success in fields that enforce alphabetic ordering of author names and citation styles that promote the first author (Einav & Yariv, 2006). Though changing the approach of indicating scientific contribution cannot eradicate such biases in all of science, it might combat them to some degree in terms of authorship credit.

The issue of authorship is relevant for any kind of research project that deals with crediting the researchers who have made contributions to it. Yet, there are some specific characteristics of qualitative research traditions that make thinking about how to credit authorship appropriately seem especially important. The subjective, inductive, and iterative nature of many methods and paradigms in qualitative research like unstructured or semi-structured interviewing and inductive probing (e.g., Guest et al., 2013) leads to a situation where, by design, data collection and results are often not independent from the subjective perspective of the researcher(s) conducting the research (Kalu, 2019; Peshkin, 1988). While this is a central feature and asset of qualitative research that should not be missed, it makes it especially pressing to increase transparency and accountability about who did what specifically in the research process. Thus, the system we use to credit authorship should be aligned with these goals.

In light of the variety of all the aforementioned difficulties to derive author responsibility from our scholarly articles, we argue that decreasing the vagueness in the byline could diminish the insecurities that arise from the current system. For example, by explicitly replacing the byline order with visibly assigning contributor roles to each author (Allen et al., 2014; Holcombe, 2019). We recommend four simple changes to each newly submitted manuscript that authors and stakeholders could adopt to make author contributions more transparent, accountable, and equal by overcoming the problems discussed

TABLE 1 Overview of the suggestions for increasing transparency, accountability, and equality as well as their benefits for the scientific community

Section	Suggestions	Transparency	Accountability	Equality	Further benefits
Title page	Author name(s) In the byline, the names of all authors are listed alphabetically	Prevents interpretability on author order basis	Authors are clearly identified	There is no special position for single authors	Breaks with conflicting norms and prevents author order conflicts
Contributor role(s)	The name of each author is followed by the abbreviation for the corresponding CRediT role(s) superscripted and in brackets right before the number for the corresponding affiliation	Each author's contributions are made explicit	Possibility to directly contact the person responsible for a contribution of interest	Appropriate valuation of each author's contributions. Possibility to share roles	Possibility to evaluate scientists by extracting their contribution roles across publications
Correspondence information	The correspondence information as part of the author note contains the contact information of all contributing authors. The contact information includes (a) full name, (b) email address, and (c) a more stable contact information such as an ORCID iD	Contact information of all authors are disclosed. Authors (with similar names) are clearly identifiable	Authors can be directly contacted depending on their contributions	All authors can equally be contacted.	Increases the likelihood of reaching any contact person. More efficient communication
In-text citations	In-text citations follow the rules of a numeric citation system. Square brackets instead of round brackets are used for in-text citations	Prevents interpretability on author order basis	First author names do not serve as a proxy for the whole scientific contribution	Increases fairness by omitting first-author names from the main text	Increases readability. Bibliographic information can be looked up without emphasizing the first author
Bibliography	The reference list entries follow the rules of a numeric citation system, listing all references according to their number in the text followed by (a) the title of the published work, (b) the publication year, (c) the name of the author(s) listed alphabetically, and (d) the source of the work	Prevents interpretability on author order basis	First author names do not serve as a proxy for the whole scientific contribution	Increases fairness and equality for the authors	Emphasizes the scientific end-product instead of its authors

above. Ultimately, we rebut anticipated critiques before discussing how all stakeholders benefit from our suggested changes.

Suggestions for crediting authors in psychology

The APA style is at the heart of the psychological community as a leading source of recommendation for editors and publishers as well as a foundation for students and researchers alike. We aim to foster transparency, accountability, and equality based on contributorship within contemporary psychology by relying on this sophisticated and approved manual (American Psychological Association, 2019). We believe that the implementation of the following suggestions can be done by the authors as a first step, but we strongly recommend that the APA should consider adapting their guidelines accordingly so that publishers could establish them as new standards.

In the following, we will present our suggestions for an overhaul of the practices regarding visibility of author credit, citation, and referencing. We will organize our suggestions for improvements in accordance with the structure of a scientific manuscript, which most likely will be familiar to the readers: (1) title page, (2) in-text citations, and (3) bibliography. Figures to illustrate the following suggestions can be found in the Supplementary Material. [Table 1](#) gives a quick overview over all our suggestions and how they improve transparency, accountability, and equality.

Title page

When reading a scholarly article, the first thing a reader will see is the title page. Hence, this page should contain an article's most relevant meta-data. As outlined in this article, we consider it mandatory that author contributions are visible to the reader. Therefore, our first proposition targets an implementation of contributorship on the title page.

Authors: In most articles, the title page provides the reader with the information about who the authors of a published article are. Yet, it fails to give any reliable information about the individual contributions of the different authors as long as the underlying norm is not disclosed. To enhance transparency, one could consider the usage of the [CRediT](#) (Allen et al., 2014) already on the title page to enable readers to identify which author has contributed to which contents or sections of a paper. This easy-to-use taxonomy encompasses 14 different roles reflecting common contributions in scientific papers and makes a decisive contribution not only to transparency, but also to the appreciation of the individual contributions. Hence, using this taxonomy would make the expertise each candidate has added to the manuscript and the contribution they have actually made to a scientific output explicit.

Systems based on contributor roles (Allen et al., 2014; Holcombe, 2019; McNutt et al., 2018; Rennie et al., 1997) appear to be well received by authors. Expressing contributorship directly links the accountability for a certain contribution to one or several authors. Disclosing those contributor roles is proposed to be suitable to make contributors more approachable regarding a specific topic. This may foster collaborations, and reward specialists (Holcombe, 2019). Furthermore, Sauermann and Haeussler (2017) found that, in case of disclosed contributions, most authors feel more informed about contributions in general compared to the byline order. At least a third felt also more informed about the share of effort a particular co-author had in contrast to other co-authors, about how important a specific author's responsibility contributed to the success of the publication, and about the “share of credit the co-author should get for the paper” (Sauermann & Haeussler, 2017, p. 5). Only a quarter of the respondents in the study found the author order more informative than the authorship contribution statements. We suppose that this is most likely due to a lack of standardization of expressing contributor roles between journals, which could render contribution sections in some fields less informative. This further underlines the value of establishing them as mandatory in a publication manual.

Consequently, when listing the contributing authors, we recommend using the CRediT taxonomy (Allen et al., 2014) on the title page by superscripting the appropriate abbreviation(s) right ahead of the affiliation number(s) to clearly show the contribution(s) of each author (see Figure S1 for an example and Table S1 for the abbreviations). This will make contributions salient for editors and, if also implemented by journals, provides a guide for readers with a minimum of changes required to existing layouts.

But what about the existing recommendations for author order that might still invoke disagreement? In our view, the *SDC approach* (Tschardt et al., 2007) as the prevailing standard should also be reconsidered and replaced with a much clearer contribution system that is less prone to (mis-) interpretation. To ensure that a new organization of the authorship order is as easy to implement and as time-saving as possible, we suggest that all contributing authors are listed in an alphabetical order of their family names. Removing any information from the order of the byline could foster the attention to the displayed contribution of individual authors. In this way, equality regarding the awareness pertaining such contributions – especially in multi-author collaborations – is highly promoted. However, if the alphabetical ordering is not accompanied by a change in the citation style (as outlined in the subsection *In-text citation*), we instead recommend a random order to avoid surname bias (Einav & Yariv, 2006).

Corresponding information: Another important aspect of the title page is the correspondence information, which should be included in the author note and “provides a point of contact for interested readers” (American Psychological Association, 2019, p. 35). However, as “any author” (American Psychological Association, 2019, p. 37) can be listed as the corresponding person, the chance that an author who was not responsible for every aspect of the work will be listed as the corresponding person is high. Thus, they might not be able to (appropriately) answer incoming questions about specific aspects of the published work. This might be the case, for instance, if there are analyses-related queries, but the corresponding author was responsible for writing the manuscript. If so, the corresponding author would have to forward the question to the responsible person. In contrast, it is much more effective to contact the right person directly.

Hence, rather than listing any single author as the corresponding author, we recommend listing the contact information of every author. However, we think that the postal address represents an outdated information, which (a) is likely to change over time due to the academic system and possibly more frequent changes of institutions of ECRs, (b) is unlikely to be used very often due to the rapid digital development worldwide, and (c) takes up an extreme amount of space. This is why we recommend mandatory listing a more stable or frequently updated contact information such as one's ORCID iD² rather than the postal address. We further recommend to list the ORCID iD in addition to the complete mailing address of the corresponding author and as the contact information for each other author of a scientific output. This is also in line with the recommendations of the APA-style that already allow for the inclusion of ORCID iDs.

However, it is important to note that listing each author's contact information does not mean that a scientific output is no longer a collaborative effort and each author is responsible only for their section(s). Since scientific work still is a joint collaboration, our recommendations should not encourage authors to only have ownership over their respective sections. In this vein, we recommend adding the statement “All authors approved the final manuscript”.

In sum, regarding the title page, we recommend enhancing transparency, fairness, and the appreciation of each author's contribution by (a) alphabetically listing authors, (b) clearly indicating the contribution roles of each author, and (c) listing more stable correspondence information of each author. However, as the title page is not the only element at which these issues can be addressed, further changes should be made.

²<https://orcid.org/>

In-text citations

In-text citations are common in scientific literature for distinguishing other authors' findings from the own original work and come in different styles. In psychological journals, they are usually a combination of a maximum number of two to three author names (depending on whether the journal uses APA 6th or 7th edition guidelines) and the year of publication. In case that more than this number of authors are credited in the manuscript byline, all authors beyond the first are abbreviated as “et al.” While this improves the readability of the manuscripts, it also fosters inequality by promoting the first author (even in co-first authorship publications) due to mere exposure effects (Zajonc, 1968) and verbally associating the first author with the scientific contribution (e.g., imagine a colleague talking about “the recent paper by Smith et al.”). The reliance on these author-date citations has been suggested as a source of surname bias in other disciplines (Einav & Yariv, 2006), underlining this subtle but impactful emphasis on the first author.

This imbalance introduced by the author-date-system thereby diminishes the equal visibility of all author contributions. While this is perfectly fine for a scientific environment with one or two authors in the byline (like the psychology of the early 20th century), we aim at providing suggestions for adjustments that uphold readability and clarity regarding today's author consortia, while simultaneously enhancing equality. Thus, we recommend relying on numeric systems for in-text citations (see S2 in the Supplementary Material for an example). To avoid confusion with statistical information, which is often found in psychological texts and indicated by round brackets, we recommend the use of square brackets. In our opinion, as the text is not interrupted by long parentheses, this approach further facilitates reading fluency. Links to the reference sections ensure that readers can quickly identify the cited work.

Bibliography

Regardless of whether the bibliography or reference section is based on the author-date- or numerical system, each reference should always contain (at least) the following elements: (a) the name of each author, (b) the year of publication, (c) the title of the published work, and (d) the work's source (e.g., American Psychological Association, 2019). In this vein, a shared characteristic of all previous systems is the guideline that a reference in the bibliography always starts with listing the author(s). However, we believe that this system also is harmful to the principle of equality and should therefore be reconsidered. Over and above the suggestion of using a numerical system for the in-text citations, we therefore recommend listing the aforementioned elements of a paper in the following order: (a) the title of the published work, (b) the year of publication, (c) the name of each author in alphabetical order of their family names, and (d) the work's source. This approach substantially facilitates focusing on the, in our view, most important element of scientific research, which is not the first author, but the scientific contribution.

An option to further enhance working with this bibliography style would be to directly display the reference via mouseover text or to reference the first occurrence of the in-text citation so that readers could easily look up the context in which the respective article is cited.

Critiques and limitations

Although we consider the proposed changes as easily implementable, changes to an established system might make certain critical thoughts pop up in a reader's mind. Some might address the underlying idea of our article while others might address the changes as such. Therefore, we strived to elaborate on some concerns below.

Are we not going to lose a valuable heuristic when contribution is no longer indicated by author order?

The current system is very poorly suitable for assessing a person's contribution. For example, the competing recommendations between using SDC or FLAE allow to only speculate about the actual contribution of a given author except for the first author, whose contribution then still can only be inferred to be the largest among all authors. The current heuristics are prone to misattribution concerning responsibilities in a research project,³ which neither benefits stakeholders nor incentivizes “middle authors” to feel accountable for a publication.

In contrast, contribution-based systems protect the effort of (junior) researchers by crediting their work directly instead of ordering them according to the perceived value of their contribution (Rennie et al., 1997). Hence, we argue that credit-based systems that transparently display the contributions of each author can strongly increase the accuracy in assessing a researcher's merit relative to existing norms.

Why is assigning CRediT roles to names more effective than contribution statements?

Author contribution statements are small paragraphs at the end of a manuscript stating which author(s) contributed to which part of the research process. They are a valuable step in the right direction. However, many journals still do not list them as a requirement for publication. Moreover, these statements are often not visible due to being placed at the very end of the manuscript and are obviously still not considered important meta-information. Partially, this might be motivated by a lack of standardization for those sections. Relying on the CRediT taxonomy can resolve this issue and establish comparability between articles.

Moreover, CRediT is already adopted by several publishers (e.g., British Psychological Society), institutions (e.g., University of Glasgow), integrators (e.g., OpenConf), and publishing outlets (e.g., Wellcome Open Research). This is hardly surprising, as it seems to be – at least at the moment – the most prominent system likely to resolve issues of equality and transparency. The placement in the byline ensures the visibility of this important metadata.

The roles of the CRediT system are not exhaustive. What if I do not find a role that fits my contribution?

Adopting an already elaborated and standardized system is a huge advantage for establishing clarity and comparability between contributions. CRediT is currently one of the most used systems utilizing contributor roles, and therefore, it is our first choice for a contribution-based authorship system. Having this pivot point for distributing changes, missing roles can be added (e.g., for specific qualitative research paradigms) and ambiguous roles can be clarified in future iterations of the systems without sacrificing comparability to earlier CRediT versions. Indeed, the widespread use of CRediT most likely will accelerate the consolidation of the set of contributor roles and increase the consistency across publications.

Will roles not just replace positions as the new prestige carriers?

In contrast to the current emphasis on author positions, a system with roles will not be based on an “all or nothing”-principle. Each role can be assigned multiple times and each contributor can be assigned

³See Sauermaun and Haeussler (2017) for examples about which contributions are heuristically attributed to certain positions in the byline.

multiple roles.⁴ Therefore, a system with roles would even counteract potential role conflicts. Qualitative research traditions with subjective and inductive character should profit from these possibilities especially (e.g., when data curation and analysis are intertwined closely). Roles are explicitly designed to highlight expertise and can thus prevent conflicts – especially if they are defined in advance. In case of uncertainties, a role questionnaire could be used with this system for prior agreement on the assignment of roles (and, thus, concrete tasks in the process of drafting a manuscript).

However, when implementing the CRediT taxonomy widely in combination with the alphabetical listing of all authors, it should be considered – at least for a transitional phase – that it is not immediately apparent to all readers which system is being applied (alphabetical order vs. SDC or FLAE). To avoid confusion and further promote transparency, a specific symbol could be used to indicate that the authors are listed in alphabetical order.

Why not just use CRediT, but extend this system by implementing additional adjustments?

Relying on the CRediT taxonomy is a significant step in the right direction. However, merely using this taxonomy limits the increase in openness and transparency to a scope that is not large enough due to the social psychological and cognitive dimensions that accompany how we implicitly communicate responsibility for an article through in-text citations and byline order. This is why we propose further adaptations in other sections of each published work. Subsequently, alongside with the proposed changes regarding in-text citations and bibliography, transparency, accountability, and equality are fundamentally promoted.

How should research be cited in oral formats (e.g., presentations and talks)?

As the APA manual primarily considers manuscripts, our system aims at improving the shortcomings of these conventions of authorship. Needs in oral formats differ in many respects from the needs in scholarly writing. Reading an article is a self-paced process, which allows looking up information at the reader's discretion. By contrast, oral presentations have often strict limitations with respect to time and sentence complexity. Therefore, we recommend citation forms which make the research identifiable, but do not make a single author the *primus inter pares*. One way for achieving this goal could be to use project names or lab names instead of an author-year system. Examples for existing research, which are more widely known by the project name rather than the first author, include the Many Labs Studies (Klein et al., 2018) or the Framework of Open and Reproducible Research Training (FORRT; Parsons et al., 2022). If this is not feasible, we recommend using numbered citations in conjunction with a reference slide and verbally focusing on the content of the investigation rather than attempting to abbreviate content that is important to a talk with the first author's surname. In this way, the focus on the scientific contribution also prevents confusion among a portion of the audience that might not be able to readily retrieve the specific content based on the first author's name and the year of publication.

Will the proposed changes challenge established metrics such as the h-index, making their use impossible?

Established metrics such as the h-index have their benefits, especially from an ecological point of view. Importantly, our suggestions do not touch these established metrics. For example, after implementing

⁴Although the current system also allows for multiple co-first authors, many concerns such as the increased visibility of the actual first position name remain (e.g., Rose-Clarke & Fellmeth, 2019). Moreover, co-middle authorship is virtually absent in the literature highlighting the lack of transparency in SDC and FLAE.

our suggestions, it is still possible to compute the h-index or to rely on the number of publications. Noteworthy, our suggestions offer the chance to compute new, more specific and fine-grained metrics such as the number of times a researcher has made a specific contribution to publications, potentially serving as a proxy for the experience a researcher has with a certain role. The consistent use of contributor roles might even open up opportunities for new research on authorship in psychology (e.g. how roles change over the course of an author's career).

What if the suggestions do not eliminate conflicts about authorship – especially in settings with a power asymmetry?

Our recommendations aim at making contributions more visible in comparison to the current author-position system. They are not specifically designed at determining who deserves to be an author or to determine the amount of contribution. Historically, guidelines to determine authorship have already been shown to not withstand author requirements. For example, the criteria that the International Committee of Medical Journal Editors (ICMJE, 2021) implemented for defining the requirements for authors to be listed in the byline are: a substantial contribution to the research process, a contribution to the draft, the approval of the published version, *and* the agreement to the integrity accountability (ICMJE, 2021). In the first 6 years after their implementation between 4.0% and 60.0% of the publications in journals enforcing these criteria listed authors in the byline that did not substantially contribute to the research process or the draft (Bates et al., 2004). Baskin (2014) later noted that the ICMJE ruleset substantially limits the number of people who can be considered authors although they might be considered valid contributors by their peers. Therefore, our recommendations do not aim to regulate authors about who is allowed to be listed in the byline. We rather encourage authors to list any relevant contributor as long as their contributions are transparently disclosed.

Moreover, our suggestions cannot and are not designed to solve the imbalance in power, which is a problem immanent to a scientific environment based around tenure. However, our system strengthens accountability. If senior authors claim more roles, they are also accountable for the content and need to be able to respond to critical questions. For example, if someone claims the role data analysis, they must be able to answer questions regarding data analysis. An author, who consistently fails to respond to such questions, might actually lose prestige in the eyes of their colleagues. Claiming roles which a person did not fulfil should be treated as scientific misconduct in institutional policies and ECRs might invoke the local ombudsperson to resolve these problems. After all, we argue that contributing to a specific role in a research project is far easier to prove and to discuss than the magnitude of contribution.

Why not use the author order to indicate the amount of effort each author put into the research and just add contributor roles?

The order reflects a poor indicator of contribution, not the least because of the existence of two contradictory norms. There are already some alternative suggestions to indicate the amount of effort such as the “percent-contribution-indicated” approach which reports percentages of contribution for each author and is already used by some journals (Tscharrntke et al., 2007).

However, we refrained from recommending or implementing a strict quantification of effort, because (1) effort is hard to quantify depending on the task (e.g., is designing a survey worth more or less than distributing the survey?), (2) the amount of effort can easily change over course of a project (e.g., during the revision of an article), and (3) it will most likely lead to conflicts between authors (e.g., arguments about the exact percentage of contribution, re-negotiating the percentage after every step).

A more promising avenue, seems to be to use labels such as “lead” or “supporting” to supplement the contributor role taxonomy (Allen et al., 2014). These could be indicated by adding [L] for leading contributors and [S] for supporting contributors after each role in case of strong differences in contribution

for a certain contribution role. At this stage, we consider these additions optional, because our current main objective is to establish a mandatory way to make contributions visible at all. Moreover, the number of roles already is a good indication of the overall amount of involvement. We believe that – in comparison to the current and concurrent heuristics – a contribution-based system provides more incentives for each author to make substantial contributions to the manuscript and might lead to more evenly distributed efforts in academic writing.

Will a numerical system not make it harder to link citations across scholarly texts relative to an author-date system?

One downside of a numerical system is that the number used in in-text citations provides no immediate information on the cited research and is unstable across publications. This in turn makes it harder to connect citations across different publications without checking the reference section. At first sight, author-date systems seem superior in this aspect as citations remain stable across publications and allow readers to infer the cited research without consulting the reference section.

However, this stability might be more apparent than real, because it does not apply in the case of highly frequent surnames, such as Wang, Kim, or Smith. For example, the in-text citation “Wang et al. (2000)” could refer to any person called Wang who published a paper together with at least two other authors. As a case in point, a casual Google Scholar search for “Wang et al. 2000” (on May 13th, 2022) listed five articles first-authored by a person named Wang among the first 10 hits, each referring to an entirely different researcher.

An ostensibly stable in-text citation might, in fact, turn out to refer to entirely different research and/or researchers, as illustrated by the above example. In the worst case, a reader, who relies on the “stability” of author-date, might erroneously credit the wrong author if the reference section is not checked. Such misattributions are especially problematic for ECRs as these misattributions might favour more established researchers and thereby reinforce existing power asymmetries. By contrast, a numeric style avoids this error as the reference section must be consulted to identify the citation.

Thus, besides fostering transparency, accountability, and equality, a numerical system also avoids the above-mentioned disadvantages of author-date systems. As digital articles become more common, in-text hyperlinks and DOI effectively also lessen the effort of relating a numeric citation to a reference as the reader can easily identify the cited research.

What's in it for...

This article often refers to the needs of publishers, authors, and the scientific community. Although we are certain that every reader appreciates the ethical benefits of transparency, accountability, and equality, we want to start concluding this article with some action-oriented thoughts that focus on the benefits we see for the many parties involved.

What's in it for researchers?

Early and mid-career researchers gain enhanced visibility regarding their own contributions to certain scientific work. They will be able to show their expertise even if they are not the first author. This might be especially important for applications, where one must display strengths and expertise to get hired or promoted. Clearly indicating who did what also means a greater payoff for investing time in cooperative projects, which enhances collaborative work, knowledge sharing, and knowledge gain. Moreover, contributor roles reward specialization and the development of a high level of expertise in a certain area (e.g., programming) – something which might not even be recognized with authorship by some of the

current authorship conventions (Holcombe, 2019). As research projects increasingly require a diverse range of skills for succeeding, specialists are needed more than ever.

There are also a number of benefits for senior researchers. Since senior researchers are often confronted with the assumption of receiving honorary authorships, the individual contribution could be made more visible (Holcombe, 2019). This also means that there will be more transparency about mentoring contributions. Furthermore, it becomes clear which competencies researchers have acquired over the course of their scientific career and in which areas of manuscript preparation (e.g., methods) they bring expertise. Senior researchers also indirectly profit from a contribution-centered system as they can specifically consider certain skills and expertise missing in their current teams in collaboration or hiring decisions.

What's in it for publishers and editors?

In the long run, the recommendations provided in this article will increase the consistency across journals and facilitate the publication process. Reviewing is facilitated because CRediT simplifies search for reviewers as their expertise is more transparently communicated. For example, being listed in the byline on a paper about depression does not necessarily mean that the person is an expert on the disorder. The person might just have been the statistical/methodological expert designing the statistical model. Moreover, editors might also assign reviewers to only review a certain aspect of the study (e.g., the statistical modelling).

Currently, correspondence information of co-authors is already collected in most cases, but the collected information varies in depth from outlet to outlet. We recommend a coherent and concise way to report this information, which can also be used to get consent/approval from co-authors during the publication process. This might also enable shared submitting author roles. This seems to be especially beneficial if one submitter cannot continue the submission process (e.g. due to illness).

What's in it for funders?

Crediting authors transparently also has several advantages for funders. First, the system allows funding agencies to more easily assess the expertise of applicants. Second and related to the first point, the provided transparency makes it easier to gauge the likelihood of success for a project. Via contributor roles, funders have an easy means to assess that the team of applicants have the right set of skills and expertise for the project at hand (Holcombe, 2019). Third, funders can use information from contributor roles to search for reviewers, whose expertise best match the topics of the grant proposal. Via this approach, researchers, who were previously “invisible” middle authors, could qualify as experts. Thus, the pool of suitable candidates for reviewers can increase.

CONCLUSION

In this article, we highlighted the pitfalls of the current authorship credit heuristics dominant in psychological science. Currently, crediting authors in psychology almost exclusively relies on the recommendations of the APA manual (currently in its 7th edition; American Psychological Association, 2019) and on authors implementing and interpreting those statements in their work. Although the APA manual and its guidelines were originally developed to meet the needs of the scientific community, some aspects of this objective seem to have lost ground in recent years with regard to authorship, especially with respect to the requirements of Open Science.

In our opinion, important characteristics such as transparency, accountability, and equality are no longer satisfactorily met by the author order recommendation. This has special relevance for qualitative

research, in which data acquisition and analysis are often intricately connected to the individual researcher. Hence, practices that visibly facilitate and promote scientific exchange and collaborations are urgently needed. For this reason, we call for evolving the system towards contributorship, which will foster good scientific practice rather than unleashing disputes regarding a scientist's reputation – a system that values cooperation and collaboration rather than arguing over a place in the byline. To get closer to this overarching goal, we have gathered suggestions for displaying contributorship that are easy to implement and will benefit all stakeholders.

In sum, we recommend an informational redesign of (a) the layout of the title page insofar as all authors and their most persistent correspondence information should be listed in alphabetical order of their family names, thereby clearly indicating the individual contributions using the CRediT taxonomy (Allen et al., 2014), (b) the in-text citations by using a numeric rather than an author-date-system, and (c) the bibliography so that the work's title appears as the first information and the names of the authors (listed alphabetically) are listed after the publication year. Those three small steps can already go a long way to explicitly refocus scholarly articles on the academic exchange instead of the academic personnel. A consistent implementation of these simple suggestions can substantially advance the open knowledge infrastructure as well as our open research culture.

AUTHOR CONTRIBUTIONS

Myriam A. Baum: Conceptualization; project administration; writing – original draft; writing – review and editing. **Moritz N. Braun:** Conceptualization; project administration; writing – original draft; writing – review and editing. **Alexander Hart:** Conceptualization; project administration; writing – original draft; writing – review and editing. **Véronique I. Huffer:** Conceptualization; writing – original draft; writing – review and editing. **Julia A. Meßmer:** Conceptualization; writing – original draft; writing – review and editing. **Michael Weigl:** Conceptualization; project administration; writing – original draft; writing – review and editing. **Lasse Wennerhold:** Conceptualization; project administration; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST


All authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable as the article describes entirely theoretical research.

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REFERENCES

- Allen, L., Scott, J., Brand, A., Hlava, M., & Altman, M. (2014). Publishing: Credit where credit is due. *Nature*, 508(7496), 312–313. <https://doi.org/10.1038/508312a>
- American Psychological Association (Ed.) (Ed.). (2019). *Publication manual of the American psychological association* (7th ed.). American Psychological Association.

- Bartlett, A., & Mercer, G. (2000). Reconceptualising discourses of power in postgraduate pedagogies. *Teaching in Higher Education*, 5(2), 195–204. <https://doi.org/10.1080/135625100114849>
- Baskin, P. K. (2014). Authorship and contributorship: Who did what? *Science Editor*, 37(2), 39–40.
- Bates, T., Anić, A., Marušić, M., & Marušić, A. (2004). Authorship criteria and disclosure of contributions: Comparison of 3 general medical journals with different author contribution forms. *JAMA*, 292(1), 86–88. <https://doi.org/10.1001/jama.292.1.86>
- Bentley, M., Peerenboom, C. A., Hodge, F. W., Passano, E. B., Warren, H. C., & Washburn, M. F. (1929). Instructions in regard to preparation of manuscript. *Psychological Bulletin*, 26(2), 57–63. <https://doi.org/10.1037/h0071487>
- Bi, H. H. (2022). Four problems of the h-index for assessing the research productivity and impact of individual authors. *Scientometrics*, 1–15. <https://doi.org/10.1007/s11192-022-04323-8>
- Einav, L., & Yariv, L. (2006). What's in a surname? The effects of surname initials on academic success. *Journal of Economic Perspectives*, 20(1), 175–187. <https://doi.org/10.1257/089533006776526085>
- Fischer, P., Krueger, J. I., Greitemeyer, T., Vogrinic, C., Kastenmüller, A., Frey, D., Heene, M., Wicher, M., & Kainbacher, M. (2011). The bystander-effect: A meta-analytic review on bystander intervention in dangerous and non-dangerous emergencies. *Psychological Bulletin*, 137(4), 517–537. <https://doi.org/10.1037/a0023304>
- Forscher, P. S., Wagenmakers, E., Coles, N. A., Silan, M. A., Dutra, N. B., Basnight-Brown, D., & IJzerman, H. (2020). The benefits, barriers, and risks of big team science.
- Frith, U. (2020). Fast lane to slow science. *Trends in Cognitive Sciences*, 24(1), 1–2. <https://doi.org/10.1016/j.tics.2019.10.007>
- Guest, G., Namey, E. E., & Mitchell, M. L. (2013). *Collecting qualitative data: A field manual for applied research*. Sage.
- Helgesson, G., & Eriksson, S. (2019). Authorship order. *Learned Publishing*, 32(2), 106–112. <https://doi.org/10.1002/leap.1191>
- Herb, U. (2015). *Open Science in der Soziologie: Eine interdisziplinäre Bestandsaufnahme zur offenen Wissenschaft und eine Untersuchung ihrer Verbreitung in der Soziologie*. Werner Hülsbusch. <https://doi.org/10.5281/zenodo.31234>
- Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences*, 102(46), 16569–16572. <https://doi.org/10.1073/pnas.0507655102>
- Holcombe, A. O. (2019). Contributorship, not authorship: Use CRediT to indicate who did what. *Publications*, 7(3), 48. <https://doi.org/10.3390/publications7030048>
- International Committee of Medical Journal Editors. (2021). *ICMJE|Recommendations | Defining the Role of Authors and Contributors*. <http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html>
- Kalu, M. E. (2019). How does “subjective I” influence a qualitative research question, theoretical approach and methodologies? *Global Journal of Pure and Applied Sciences*, 25, 97–101. <https://doi.org/10.4314/gjpas.v25i1.13>
- Karau, S. J., & Williams, K. D. (1993). Social loafing: A meta-analytic review and theoretical integration. *Journal of Personality and Social Psychology*, 65(4), 681–706. <https://doi.org/10.1037/0022-3514.65.4.681>
- Klein, R. A., Vianello, M., Hasselman, F., Adams, B. G., Adams, R. B., Jr., Alper, S., ... Sowden, W. (2018). Many labs 2: Investigating variation in replicability across samples and settings. *Advances in Methods and Practices in Psychological Science*, 1(4), 443–490.
- McNutt, M. K., Bradford, M., Drazen, J. M., Hanson, B., Howard, B., Jamieson, K. H., Kiermer, V., Marcus, E., Pope, B. K., Schekman, R., Swaminathan, S., Stang, P. J., & Verma, I. M. (2018). Transparency in authors' contributions and responsibilities to promote integrity in scientific publication. *Proceedings of the National Academy of Sciences of the United States of America*, 115(11), 2557–2560. <https://doi.org/10.1073/pnas.1715374115>
- Mendenhall, M., & Higbee, K. L. (1982). Psychology of the scientist: XLVIII. Recent trends in multiple authorship in psychology. *Psychological Reports*, 51(3), 1019–1022. <https://doi.org/10.2466/pr0.1982.51.3.1019>
- Montoya, R. M., Horton, R. S., Vevea, J. L., Citkowitz, M., & Lauber, E. A. (2017). A re-examination of the mere exposure effect: The influence of repeated exposure on recognition, familiarity, and liking. *Psychological Bulletin*, 143(5), 459–498. <https://doi.org/10.1037/bul0000085>
- Moshontz, H., Campbell, L., Ebersole, C. R., IJzerman, H., Urry, H. L., Forscher, P. S., ... Chartier, C. R. (2018). The psychological science accelerator: Advancing psychology through a distributed collaborative network. *Advances in Methods and Practices in Psychological Science*, 1(4), 501–515.
- Nicholas, D., Watkinson, A., Boukacem-Zeghmouri, C., Rodríguez-Bravo, B., Xu, J., Abrizah, A., Świgoń, M., & Herman, E. (2017). Early career researchers: Scholarly behaviour and the prospect of change. *Learned Publishing*, 30(2), 157–166. <https://doi.org/10.1002/leap.1098>
- Odic, D., & Wojcik, E. H. (2020). The publication gender gap in psychology. *American Psychologist*, 75(1), 92–103. <https://doi.org/10.1037/amp0000480>
- Parsons, S., Azevedo, F., Elsherif, M. M., Guay, S., Shahim, O. H., Govaart, G. H., Norris, E., O'Mahony, A., Parker, A. J., Todorovic, A., Pennington, C. R., Garcia-Pelegrin, E., Lazić, A., Robertson, O., Middleton, S. L., Valentini, B., McCuaig, J., Baker, B. J., Collins, E., ... Aczel, B. (2022). A community-sourced glossary of open scholarship terms. *Nature Human Behavior*, 6, 312–318. <https://doi.org/10.1038/s41562-021-01269-4>
- Pavlidis, I., Petersen, A. M., & Semendeferi, I. (2014). Together we stand. *Nature Physics*, 10(10), 700–702. <https://doi.org/10.1038/nphys3110>
- Peshkin, A. (1988). In search of subjectivity – One's own. *Educational Researcher*, 17(7), 17–21. <https://doi.org/10.3102/0013189X017007017>
- Rennie, D., Yank, V., & Emanuel, L. (1997). When authorship fails. A proposal to make contributors accountable. *JAMA*, 278(7), 579–585. <https://doi.org/10.1001/jama.278.7.579>

- Rose-Clarke, K., & Fellmeth, G. (2019). Co-first authorship and gender equity in academic publishing. *The Lancet*, 393(10185), 2036. [https://doi.org/10.1016/S0140-6736\(19\)31040-2](https://doi.org/10.1016/S0140-6736(19)31040-2)
- Sauerermann, H., & Haeussler, C. (2017). Authorship and contribution disclosures. *Science Advances*, 3(11), e1700404. <https://doi.org/10.1126/sciadv.1700404>
- Schaerer, M., Teo, L., Madan, N., & Swaab, R. I. (2020). Power and negotiation: Review of current evidence and future directions. *Current Opinion in Psychology*, 33, 47–51. <https://doi.org/10.1016/j.copsyc.2019.06.013>
- Sigal, M. J., & Pettit, M. (2012). Information Overload, Professionalization, and the Origins of the Publication Manual of the American Psychological Association. *Review of General Psychology*, 16(4), 357–363. <https://doi.org/10.1037/a0028531>
- 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>
- Smith, M. (1958). The trend toward multiple authorship in psychology. *American Psychologist*, 13(10), 596–599. <https://doi.org/10.1037/h0040487>
- Strange, K. (2008). Authorship: Why not just toss a coin? *American Journal of Physiology-Cell Physiology*, 295(3), C567–C575. <https://doi.org/10.1152/ajpcell.00208.2008>
- Tscharntke, T., Hochberg, M. E., Rand, T. A., Resh, V. H., & Krauss, J. (2007). Author sequence and credit for contributions in multi-authored publications. *PLoS Biology*, 5(1), e18. <https://doi.org/10.1371/journal.pbio.0050018>
- Venkatraman, V. (2010). Conventions of scientific authorship. *Science*. <https://doi.org/10.1126/science.caredit.a1000039>
- Winston, R. B. (1985). A suggested procedure for determining order of authorship in research publications. *Journal of Counseling and Development*, 63(8), 515–518. <https://doi.org/10.1002/j.1556-6676.1985.tb02749.x>
- Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology*, 9(2), 1–27. <https://doi.org/10.1037/h0025848>
- Zajonc, R. B. (2001). Mere exposure: A gateway to the subliminal. *Current Directions in Psychological Science*, 10(6), 224–228. <https://doi.org/10.1111/1467-8721.00154>

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