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Text Recycling in STEM Research: An Exploratory Investigation of Expert and Novice Beliefs and Attitudes

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Abstract

When writing journal articles, science, technology, engineering and mathematics (STEM) researchers produce a number of other genres such as grant proposals and conference posters, and their new articles routinely build directly on their own prior work. As a result, STEM authors often reuse material from their completed documents in producing new documents. While this practice, known as text recycling (or *self-plagiarism*), is a debated issue in publishing and research ethics, little is known about researchers' beliefs about what constitutes appropriate practice. This article presents results of from an exploratory, survey-based study on beliefs and attitudes toward text recycling among STEM "experts" (faculty researchers) and "novices" (graduate students and post docs). While expert and novice researchers are fairly consistent in distinguishing between text recycling and plagiarism, there is considerable disagreement about appropriate text recycling practice.

Keywords

text recycling, plagiarism, self-plagiarism, publication ethics, STEM

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Introduction

Academic research in Science, Technology, Engineering and Mathematics (STEM) fields involves the production of a broad range of documents. On the way to writing a single journal article, researchers often produce a number of other genres such as grant proposals and grant reports, research registrations, conference papers and posters, and institutional review board (IRB) protocols. And in most STEM fields, authors' new journal articles routinely build directly and explicitly on their own prior work. As a result of the writing process in STEM, researchers have many occasions to reuse material from their completed documents in producing new documents. Such reuse can take the form of self-quotation, but researchers sometimes reuse material from their own prior writing without marking it as a quotation—a practice known as *text recycling* (or *self-plagiarism*). While text recycling is an increasingly important and debated issue in publishing and research ethics, little empirical research on the topic has been published.

In the present article, we present results of an exploratory study surveying beliefs about and attitudes toward text recycling among both established STEM researchers and those at the start of their careers. No previous study of attitudes toward text recycling of either population has been published. For this study, the expert population was STEM researchers with faculty appointments and the novice population consisted of graduate students and postdoctoral scholars. These surveys presented similar scenarios and questions to participants in both groups in order to assess whether, how, and when text recycling seemed permissible to them.

In what follows, we investigate how STEM researchers view factors such as the source of recycled material, the rhetorical purpose and amount of that material, and configurations of authorship in deciding whether any instance of text recycling is appropriate. We also investigate self-assessment of knowledge about text recycling and attitudes toward education and training. We believe the results of this exploratory study will help inform future research in this area and point toward opportunities for training and guidance.

Background

Text Recycling in the STEM Research Context

In science, medical, and engineering fields, research tends to advance in small steps, where each successful investigation answers some questions and generates others. Whereas a humanities scholar might work for years on a monograph, STEM researchers typically produce sequences of related articles. In engineering, this sequence might be generated as a project moves from design to implementation or from computational modeling to experiment. In medicine,

publications from research on new therapies frequently move from safety studies to small-scale clinical trials, which, if promising, lead to large-scale trials. Building on the prior work, each successive article pushes knowledge forward another step. But while each paper is expected to have a distinct research question and to present substantively original content, these researchers often have reason to repeat minor rhetorical acts from one paper to the next—such as describing common aspects of methodology and rehearsing foundational work in the review of literature.[1] In STEM fields, authors often recycle passages from their own prior work for such purposes.

Another characteristic of STEM writing process also makes researchers in these fields more likely to recycle text. Unlike scholars in, say, the humanities, STEM researchers typically produce a variety of genres over the course of a research project. In addition to the primary output goal – the research article –the STEM "genre set" (Bazerman, 1994; Devitt, 1991) includes workplace documents such as grant reports, grant proposals and IRB protocols as well as public documents such as conference posters and abstracts. By the time STEM researchers begin drafting an article, some of the necessary components have already been produced in these other documents.

The other common name for text recycling, "self-plagiarism," suggests that the practice of reusing one's prior work without quotation is improper—a view supported by some widely – circulated documents which frame text recycling as either inherently undesirable or plainly unethical (Bruton, 2014; iThenticate, n. d.; Roig, 2015).[2] However, guidelines on text recycling by some highly regarded professional organizations, including the American Psychological Association (2010) and the Committee on Publication Ethics (2013), explicitly state that text recycling can be acceptable, and sometimes even preferable, depending on the context and the nature of the specific occurrence. To date, published opinions and guidance on whether, when, and how text recycling should be used in scholarly writing have varied considerably, especially in reference to research writing in empirical research fields. Journal editors and editorial board members who may oppose recycling material from one published article to another are often fine with recycling from other genres such as grant proposals, grant reports, or conference posters (Hall et al., 2018; Pemberton, et al., 2019). Navigating these inconsistencies can be challenging even for expert STEM researchers.

Further challenges are posed by the collaborative nature of most STEM research. Unlike scholarship in the humanities, STEM research at universities tends to be carried out by teams of researchers. And while the team's leadership is stable (the faculty member who is principal investigator), a successful lab will have continuously shifting membership, with graduate students, postdocs, and perhaps even undergraduates moving in and out of the lab, picking up and advancing different strands of the lab's research agenda in overlapping teams. It is not unusual in this setting for a faculty mentor to suggest that a student recycle material from existing documents produced by the lab

(Moskovitz, unpublished research). For example, a student writing up the results of a specific investigation for a journal article may be told to use a description of a research apparatus or a specific sampling procedure from their mentor's previously published paper or from the grant proposal the mentor used to secure funding for that student's position. Should this novice researcher consider this request as an appropriate act of collaboration in a research culture which promotes clarity and consistency of communication? Or, given that the student was not an author of these documents, would the student view this as plagiarism?

The difficulty of such decisions is compounded by a lack of training. Anecdotal evidence suggests that the topic of text recycling is rarely addressed in any depth in research compliance training[3] and consistently absent from scientific writing courses and textbooks. But given the inconsistency in gatekeeper opinions and published guidelines, developing useful, accurate instructional materials requires a better understanding of text recycling as a discursive practice.

Prior Empirical Research on Text Recycling

While there is now a substantive body of research on the related practice of plagiarism (Howard, 2010; Eckel, 2011), scholarship on text recycling is still in its early stages. In the fields of writing studies and communication, the subject has received scant attention, and no empirical research has been published.[4] An early mention of text recycling in relation to professional writing is Grow's *College Composition and Communication* essay in which "reused prose" is listed among several "deficits" of professionals who write on computers (1988), but this is only a passing mention. A search of the writing studies database *Compile* returned no hits for the terms *text recycling*, *textual recycling*, or *text reuse*. Of the three references listed for *self-plagiarism*, one (Scott & Smith, 1986) is not available through the ordinary library channels. Of the other two, Michaelson's piece (1990) is a guide and Scanlon's (2007) an essay.

There have been a few empirical investigations outside of writing studies and communication on (or including) text recycling, but these have focused on quantifying inappropriate reuse rather than understanding recycling as a discursive practice.[5] Collberg and Kobourov (2005) investigated "questionable originality" in computer science articles. Roig (2005) conducted a small-scale study of articles from a single issue of a psychology journal to estimate the amount of recycling occurring in the field. Bretag and Carapiet (2007) studied "self-plagiarism" in social science and humanities papers written by Australian academics, looking for cases where the new paper overlapped by at least 10% and did not cite the source paper. García-Romero and Estrada-Lorenzo (2014) analyzed a

corpus of published papers to quantify problematic instances of reuse. Horbach and Halffman (2017) analyzed "unacceptable" cases of text recycling in a corpus of papers by Dutch academics in biology, economics, history, and psychology. For a review of other scholarship on text recycling in the social sciences, Eaton and Crossman (2018).

Methods

A pair of similar surveys were developed and administered to novice and expert academic researchers in STEM fields. The surveys were reviewed and approved by the IRB office at Duke University. We studied STEM researchers in academic settings, because this is typically where all researchers get their training and thus are normalized into the discourse conventions of their discipline. We chose to survey expert and novice populations separately, as we wanted to learn whether researchers' beliefs about text recycling changed as they obtained real-world experience.

Survey Administration/Sample

Researchers used convenience sampling to solicit participants. Invitations to take one of the two IRB-approved surveys were sent by email by one of the authors to faculty in STEM departments at their own and other institutions. These faculty were also asked to share the survey invitation as appropriate with faculty and/or graduate students in their departments. Additional solicitations for graduate students were made via email contacts to administrators of Responsible Conduct of Research (RCR) programs at universities with large STEM programs. The solicitations included a link to an online Qualtrics survey.

Instrument

The surveys were designed to avoid asking participants directly about their own writing practices, since such questions would require some participants to reveal practices that could be viewed as unethical and thus might discourage participation. Instead, the instruments were built around a set of hypothetical scenarios and questions about text recycling in the abstract. (See Supplemental Material Appendix A for the complete surveys.) The two surveys followed the same overall structure and were adjusted as appropriate for the two populations. These adjustments were primarily in the specific questions posed in the first and last blocks. In the novice survey, the scenarios were framed in the second person ("You are a graduate student . . . "), while the expert versions were framed in relation to an imaginary graduate student named "Sarah." Respondents could

answer or skip questions as they chose. Text recycling was defined in the survey as follows: "Text recycling refers to the reuse of excerpts (verbatim or nearly so) from previously published writing in a new publication without the use of quotation marks or other means to identify the material as reused."

The first survey block contained demographic questions regarding the participants' main area of research, primary languages, place of birth, and amount of experience. Research experience was determined differently in each survey: Experts were asked about faculty rank, number of published papers, and experience as a journal editor. Novices were questioned about their educational status as well as the number of scientific papers which they had authored and the number of conference papers they had presented.

The second block consisted of four hypothetical scenarios involving text recycling in which a focal point was on how collaborative authorship affects the appropriateness of text recycling. The scenarios were designed to present contexts which would likely vary in the acceptability of recycling. Scenario B was designed to present a situation which would likely be considered plagiarism rather than recycling.

The third block directly asked about the acceptability of recycling text when composing research articles in the participant's own field. The first prompt questioned the acceptability of recycling based upon the source of the recycled material (e.g., a grant proposal, a poster, a previously published journal article). The second prompt asked about appropriateness with regard to where the recycled material was located within the new article (e.g., Abstract, Introduction, Methods). Participants who indicated that recycling was acceptable in at least one section were then asked how much recycling was allowable in those sections.

The fourth block asked directly about issues of authorship. Prompts addressed different authorship situations common in STEM research contexts, including whether authors of the prior paper were authors of the new paper, which author wrote the recycled passages, and whether the authors of the new paper were members of the same research group that produced the prior paper.

The final block asked questions about participants' knowledge of appropriate text recycling practice and perceived value of future training on the topic.

Results and Discussion

Demographics

A total of 200 STEM researchers took our surveys: 130 "novices" and 70 "experts." Participants' primary areas of research are shown in Table 1. Most of both populations spoke English as a first language: 92.5% of experts and 87.3% of novices.

Table 1. Participants' Area of Research.

Field	Expert		Novice	
Biological and Biomedical Sciences	22.7%	15	34.5%	41
Engineering	15.2%	10	21.8%	26
Natural Resources and Conservation	7.6%	5	14.3%	17
Social Sciences	19.7%	13	10.1%	12
Physical Sciences	15.2%	10	8.4%	10
Agriculture and Related Sciences	4.5%	3	5.9%	7
Other	15.2%	5	5.0%	3

Table 2. Expert Participants' Rank or Status.

Rank/status	Proportion (%)
Full professor	52.3
Associate professor	23.1
Assistant professor	7.7
Full-time, non-tenure-track faculty	7.7
Emeritus faculty	6.2
Other	3.1

Experts

Expert participants' faculty rank is shown in Table 2. Over 80% had attained the rank of associate professor or higher. Regarding experience as journal editors, 45.5% of this sample reported some experience, with 12.1% reporting that they had been editors at three or more journals. Of the 66 who responded to the question about their work experience, only 5 had any substantive industry experience and only 2 had government experience.

Novices

Within this sample, 86.3% were students (PhD, 68.4%; MD/PhD, 2.6%; Masters, 12.8%; other, 2.6%). The remaining 13.7% were postdocs. As shown in Table 1, over half of novice participants were in the biological sciences or engineering. To determine their level of research experience, novices were asked the number of scientific articles which they directly participated in writing and the number of conference talks they had given (Table 3). Three quarters had participated in writing at least one paper and over two thirds had given at least one talk. Over a third had written at least three papers and/or given at least three talks. While we use the term *novices* in this article, many of these respondents had experience presenting and publishing their work.

Table 3. Experience of Novice Participants at Writing Papers and Giving Conference Talks.

Experience	Papers (%)	Talks (%)
None	25.4	31.6
1	15.3	17.1
2	19.5	11.1
3–5	23.7	28.2
6–10	10.2	8.5
More than 10	5.9	3.4

Authorship Scenarios

The next block of the survey ($n_{expert} = 66$; $n_{nov} = 113$) presented four scenarios that address how issues of collaborative authorship might intersect with decisions about text recycling. The first three scenarios focus on the type of textual material we expected would be least objectionable (which is not to say unobjectionable) to STEM researchers: a description of a measurement apparatus in a Methods section. The fourth scenario involves recycling in a nonjournal context. For each scenario, four choices were offered: "definitely appropriate," "probably appropriate," "probably NOT appropriate," and "definitely NOT appropriate" (Figure 1.)

Scenario A. *Sarah is a graduate student doing research with an environmental science lab group. Prior to Sarah joining this group, the lab published an article, "Paper A," in an environmental science journal; this article included a description of a measurement apparatus—a combination of hardware and software for measuring carbon emissions from coal plants with drones. Since Sarah is using this same apparatus in her research, her advisor suggests that she recycle that description for the Methods section* ***she*** *is currently writing for "Paper B" in her work in this lab. Is this appropriate?*

Expert responses were almost evenly divided between the four choices: A quarter of experts felt that a graduate student recycling the description of an apparatus from their research group's prior paper was definitely appropriate while the same proportion felt this practice was definitely inappropriate (Figure 1A, top). In comparison, fewer novices approved of reusing language from the lab group's previous work, with 65.8% choosing either definitely or probably not appropriate (Figure 1B, top).

For both novices and experts, responses were more varied (distributed among the answer choices) for this scenario than for any of the others. Sitting conceptually between plagiarism and the less ambiguous case of single-author text recycling, this scenario surfaces ambiguities of collaborative writing in STEM fields: Sarah is recycling prose which she had no part in generating (more like

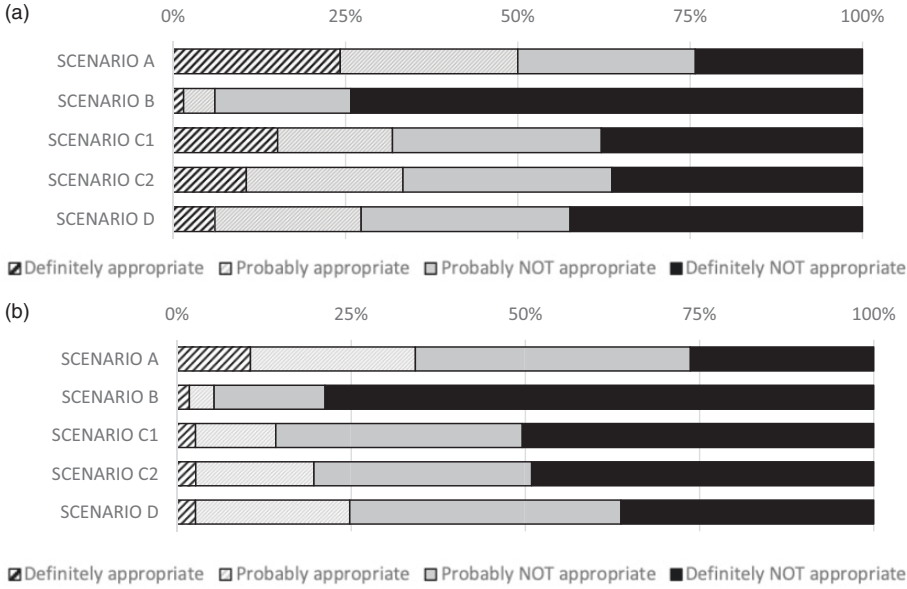

Figure 1. Expert and Novice Responses for Scenarios: (A) Experts ($n = 66$) and (B) Novices ($n = 113$).

plagiarism), but she is writing as part of a team of researchers with shifting membership who have a somewhat collaborative sense of authorship (more like text recycling). How many (if any) authors of Paper A will be authors on the new paper, Paper B, is not specified. The advisor and presumed primary investigator of the group seems to have a view that the language that describes a tool used in research is owned collectively by the group members, even those who were not part of its initial development.

Scenario B. The following year, a different group of researchers at a different university uses this same equipment set-up in a research project to study the movement of pollen from GM crops to non-GM fields. They recycle the description of the apparatus verbatim from Paper A. Is this appropriate?

For this scenario, the authors of the new paper are independent of the lab that produced the source text. Not surprisingly, this scenario generated the least approval, with "definitely" or "probably" appropriate responses totaling only 6.1% for experts and 5.3% for novices. We hypothesize that respondents tended to view borrowing such material from another group's published paper as plagiarism.

Scenario C. Some time later, Sarah has completed her PhD and taken a faculty position at a different university. She is now collaborating with a new group of colleagues doing new studies on coal emissions.

C1: She recycles the apparatus description from Paper A
C2: She recycles the apparatus description from Paper B

This scenario positions the author, Sarah, in a context between scenarios A and B, probing whether recycling rights might extend beyond current membership in a research group. In Scenario C1, Sarah recycles from a document produced by her former lab for which she was *not* an author; in C2, she recycles from a document for which she was the lead author. Among the novices, 14.2% approved recycling from Paper A, and 19.6% approved of recycling from Paper B. Among the experts, 33.3% approved recycling from Paper A, and 31.8% approved of recycling from Paper B. Scenarios C1 and C2 were thus judged similarly to one another within each group. In the view of some respondents, researchers forfeit their rights to recycle from the group's collective corpus of work when they leave the lab: Comparing scenarios A and C1, we see a drop from 34.2% to 14.2% for novice respondents and 49.9% to 33.3% for experts.

Scenario D. Later in her career, Sarah and a colleague named Karen have been collaborating on a research project. The two are asked by a major newspaper to co-author a story explaining their research for an audience of nonscientists. While drafting the piece, Sarah comes up with a really clever and insightful joke related to their research. It's one of her favorite parts of the story. A year later, Karen writes a "Commentary" which is published in a high-profile scientific journal—and she recycles Sarah's joke, almost verbatim, from the newspaper story they wrote together.

This scenario moves beyond questions of research groups and focuses on individual, dual authorship. This scenario tests to what extent researchers consider the language in a dual-authored piece as joint property, even though one author usually plays a more central role in producing any specific part of the text. Note that the recycled text here is an explanatory joke, not a measurement apparatus, and there is no indication that one author asks the other's permission to recycle the joke. Unlike the description of a measurement apparatus—where the prose is primarily informational—a joke is more fundamentally creative and original, and meaning is more intricately tied to exact wording.

About a fourth of both groups saw such recycling as appropriate: 24.7% of novices and 27.3% of experts. We cannot disentangle how much these respondents were concerned with the authorship issue and how much was about the creative nature of the content. (In other words, we do not know how many would approve of a single author recycling her own joke in a similar scenario.) But here, we may see an indication of the lower limit for opinions about recycling a coauthor's idea and language. A quarter of participants seem to believe

that the entirety of a published manuscript becomes equally owned by a coauthor regardless of who generated which parts.

Joint Analysis of Authorship Scenarios

Taken together, responses to our scenarios suggests a complex and intriguing conception of text "ownership" in the STEM research setting: Some participants see membership in a lab as entitling researchers to reuse one another's published language in certain contexts (i.e., instrument description, with permission of a primary investigator) even in cases where the original authorship was not shared, whereas this entitlement may not extend to the same members when they leave the team—even if they were authors of the source document.

Overall, experts were more accepting of text reuse than novices in all cases. Many experts and novices chose "probably" rather "definitely" answers for all scenarios except Scenario B—the one scenario which would likely be considered as plagiarism rather than text recycling. Nearly three quarters of experts and novices said that Scenario B was definitely not appropriate," with nearly all of the remaining responses being "probably NOT appropriate. For no other scenario did responses show a majority of "definitely" responses in either direction. In general, trends for "definitely" versus "probably" responses were similar for both survey populations.

Direct Questions About Authorship

A separate section of the survey asked a series of direction questions about how authorship affects the acceptability of text recycling ($n_{exp} = 64$; $n_{nov} = 100$). In response to a series of statements, participants could select "definitely true," "probably true," "probably false," or "definitely false." The initial statement was, "For multiple-authored papers, text recycling is never acceptable." Choices of true (definitely or probably) were selected by 51.0% of novices and 40.1% of experts. This roughly half-and-half split about the acceptability of text recycling in multiple-authored situations aligns with responses to scenarios discussed earlier.

This initial prompt was followed by a series of additional prompts regarding when recycling *would* be acceptable for coauthored papers. The next statement was, "For multiple-authored papers, text recycling is acceptable if the source text and the new paper have identical authors." This was selected as true by 57.0% of novices and 62.5% of experts. Here, the answers appear somewhat incongruent with the first prompt, in that a greater proportion of respondents believed that recycling could be acceptable in this specific condition than would be acceptable generally. The issue here may be that the previous question failed to provide the information about whether the person recycling text was an author of the original paper, and thus some readers were assuming a recycling

with no shared authors (plagiarism). Alternately, this may suggest that some researchers tend to disapprove of text recycling in general questions more often than in more specific questions.

For the third statement, "For multiple authored papers, text recycling is acceptable if the source text and new text share at least one author and any other authors have given permission," one of the two "true" choices was selected by 52.0% of novices and 53.1% of experts. For the fourth statement, "For multiple authored papers, text recycling is acceptable if the person who originally 'wrote' (drafted) the specific materials being recycled is one of the authors of the new paper," these choices were made by 43.0% of novices and 57.8% of experts. The final statement was "Member of a 'lab' or long-term research project can recycle from an earlier published paper produced by the same lab or project—even if the authors of the two papers are not identical." This was identified as true for 31.0% of novices and 34.9% of experts.

Not surprisingly, as the authorship becomes less direct and clear cut, approval for recycling drops. However, some support for possible recycling remains even in the more complex contexts.

What Can Be Recycled?

Another survey section asked for participants' beliefs regarding the acceptability of recycling depending on the source of the recycled material and how it was used. For all prompts in this section, the context was said to be the production of a journal article.

Origin of Recycled Text

Discussions of text recycling tend to focus on recycling from one published paper to another. Yet, the practice of text recycling is much broader, as scholars recycle to and from many types of writing. Our surveys asked participants to...

> Imagine you are currently writing a journal article (research report) in your field reporting on research you have been doing. This question asks for your opinion about text recycling when writing such an article—depending on the source of the recycled material.

Participants could choose from four answers: recycling acceptable without limits, recycling acceptable with some limits, recycling would never be acceptable, and "I have no idea" ($n_{\text{expert}} = 63$; $n_{\text{novice}} = 103$).

There was strong consensus that recycling from one's own grant proposals is acceptable (novice, 94.2%; expert, 98.5%) with varying beliefs about limitations. Both groups also indicated substantial acceptance of either unlimited or limited recycling from conference posters (novice, 90.3%; expert, 93.8%) and

papers (novice, 82.5%; expert 89.2%). Respondents were more restrained about recycling from papers published in conference proceedings, where acceptability fell to 58.3% for novices and 73.9% for experts.

Looking at genres for which at least half of respondents indicated that recycling would never be acceptable, we find two genres on which both groups agree: for an article by one's own research group members for which one was not an author, "never" was chosen by 76.7% of novices and 84.6% of experts; for a journal article authored entirely outside the group, "never" was selected by 92.2% of novices and 87.5% of experts. More than half of the novices (56.3%) also included one's own previously published journal article as a text that should never be recycled from, compared with 42.2% for experts.

For many of our respondents, publication status of the source appears to be an important factor in deciding whether recycling is acceptable. This echoes findings from prior studies of attitudes toward text recycling (Hall et al., 2018; Pemberton et al., 2019). In comparing expert and novice responses, we see here, as we did earlier, that experts were generally more tolerant of text recycling than novices.

Destination of Recycled Text

Existing guidelines on text recycling identify certain sections, Methods and Introduction in particular, that may be more appropriate for text recycling than others (Committee on Publication Ethics, 2013). We investigated opinions about location of recycled text via the prompt, "For each section listed, indicate

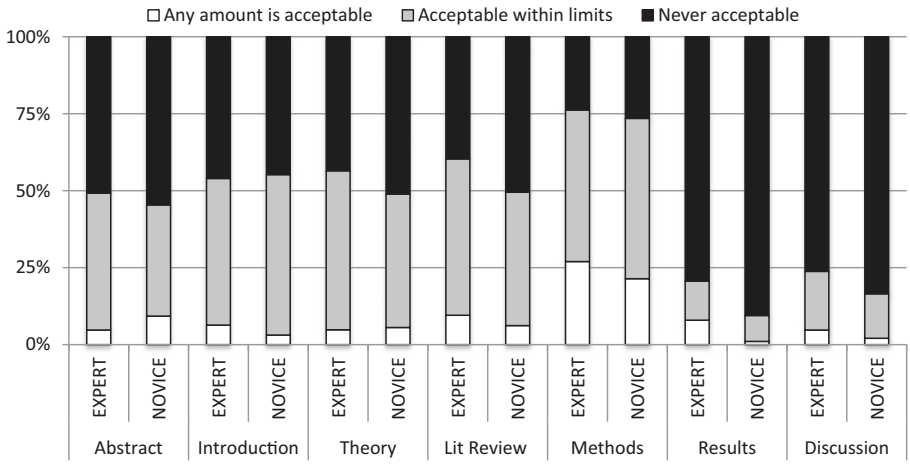

Figure 2. Responses to the Prompt: "For each section listed, indicate whether you think that using recycled text in writing that section is acceptable in your area of research" (experts, $n = 66$ and novices, $n = 97$).

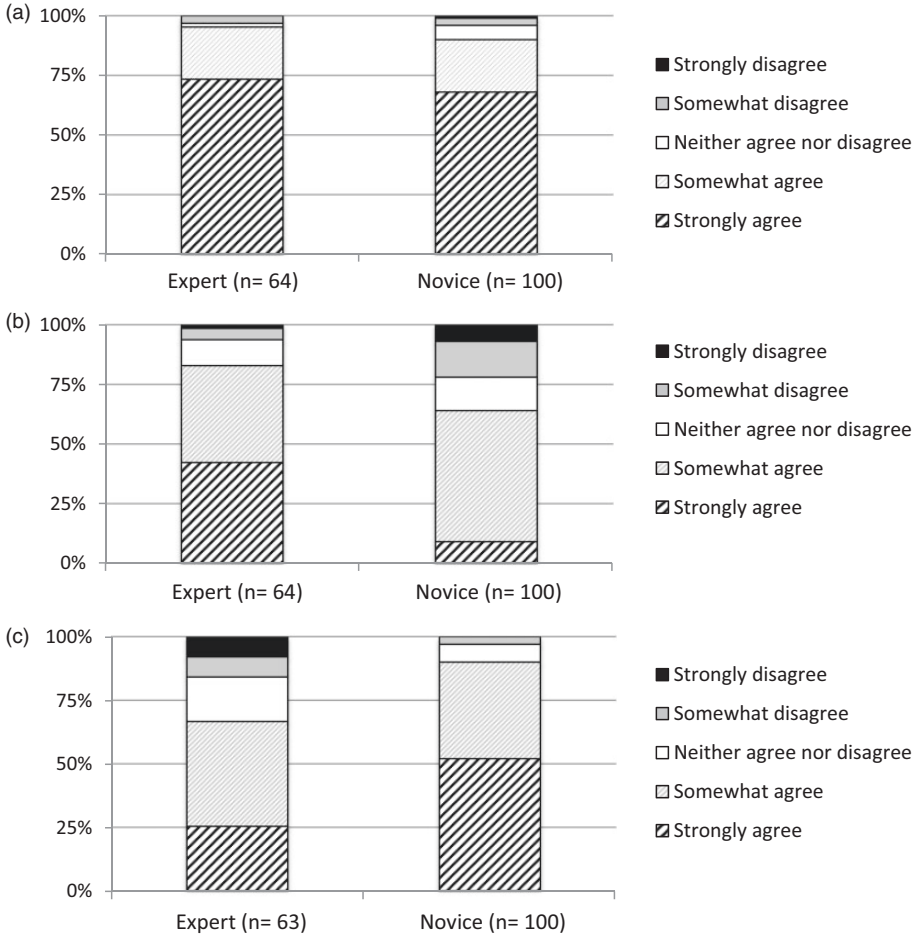

Figure 3. Concluding (a) "Before taking this survey I was aware that scientists sometimes recycle text"; (b) "I understand how and when to recycle text ethically and appropriately in my work"; (c) "I would benefit from explicit instruction regarding the ethics and conventions of text recycling for scientific writing."

whether you think that using recycled text in writing that section is acceptable in your area of research." Results are shown in Figure 2 ($n_{\text{expert}} = 63$; $n_{\text{novice}} = 97$). Participants were offered three choices: always unacceptable (black), acceptable within (unspecified) limits (gray), and acceptable without limit (white). Experts and novices generally agreed that at least *some* recycling in Methods was acceptable (combined white and gray), with nearly a quarter of each group accepting unlimited recycling in this section. For the Results and Discussion sections, a strong majority of experts and novices said that recycling was never acceptable

(black). For the remaining sections, there was a notable lack of consensus, with "never acceptable" responses between 40% and 60%. As shown by the small white segments, few experts or novices believed that unlimited recycling was appropriate for writing any section other than Methods.

Concluding Questions

The final block of the survey asked about prior awareness of text recycling, command of the issue, and the need for further training (Figure 3). Prior awareness was high among both groups, with 90.0% of novices and 95.3% of experts indicating that they "were aware that scientists sometimes recycle text" before taking the survey (Figure 3a).

Both groups also indicated confidence in knowing "how and when to recycle text ethically and properly" in their own work (Figure 3b). Experts were the more confident of the groups, with 42.2% "strongly" and 40.6% "somewhat" agreeing—for a total of 82.8%. Novices "strongly" agreed with this statement in only 9.0% of responses, with 55% agreeing "somewhat"—for a total of 64%. Respondents' self-assuredness was particular interesting given the notable lack of consensus for three of the four scenarios as well as for many other questions posed by the survey. It is possible this represents that the standards for text recycling differ due to discipline or other variables, and despite the different opinions our participants held, they were in fact holding valid opinions for their particular contexts—a condition that would take a much larger, stratified survey to investigate. It may also indicate some participants have a false confidence about their ability to navigate a confusing issue, perhaps because they are unaware how many of their colleagues hold views divergent from their own.

In spite of this apparent confidence, two thirds of experts and nearly all novices (90.0%) agreed that they would benefit from "explicit instruction regarding the ethics and conventions of text recycling for scientific writing" (Figure 3c).

Limitations

In interviews of journal editors, Pemberton et al. (2019) found that many experienced journal editors had given little previous thought to some of the complexities of text recycling and appeared to be formulating their positions as the interviews unfolded. Given the lack of educational materials or other widespread training on the topic, it is reasonable to assume that this might be the case for the current study as well. If true, we might do well to interpret the beliefs reported in this survey not as strongly held beliefs about text recycling but rather as more loosely held opinions that might shift with deeper consideration of the issues involved.

There were also limits in our participant sample. The strong majority of expert participants were tenured faculty and over half were full professors. The reasons for this sample leaning toward more experienced faculty are unclear, but a possible reason is the semi-taboo nature of the topic. Given the lack of a broad consensus on the ethics of text recycling, less – experienced faculty may be more reluctant to participate—even in a study that is stated to be anonymous. It may also be that more experienced faculty are more likely to have the time and/or feel more invested in the issue from their own experience. Either way, these data may not accurately represent less experienced experts.

The sample may also be biased due to do the convenience sampling method. The majority of both expert and novice participants were at a single highly selective R1 research institution in the United States. We have no reason to believe that researchers at such an institution would tend to hold different views on text recycling than others; however, a large proportion of our expert respondents had experience as journal editors. The survey study by Hall et al. (2018) noted that those who had served as editors tended to be less lenient regarding recycling than those who did not.

Because few subjects in our study had research experience in settings beyond the academy, our findings only reflect that setting. Researchers in government labs or industry may have different beliefs and attitudes regarding text recycling.

Finally, some of the apparent lack of consensus may be the result of factors we did not account for in our study. For instance, none of our prompts specified whether the source of recycled material was cited in the subsequent work. Future investigations with a narrower scope may be able to probe issues in greater depth than we were able to do in our already lengthy survey.

Implications

While we found broad agreement among both experienced STEM researchers and those at the start of their careers about the line between text recycling and plagiarism, we saw considerably less agreement regarding the conditions under which recycling is acceptable. This is consistent with other recent studies. In a survey of journal editors and editorial board members across the academic spectrum, Hall et al. (2018) found that while most board members were not opposed to text recycling in general, there was substantial disagreement regarding the appropriateness of recycling from one published work to another. A major finding from a related interview-based study by Pemberton et al. (2019) was that journal editors held widely divergent views on recycling between published papers and had a variety of reasons for their views.

The current study also suggests that expert researchers are more accepting of text recycling than novice researchers. There are many possible explanations for this trend. One possibility is that novices are more likely to have had recent training relating to plagiarism (particularly in required RCR programs), which

may have made them more cautious about any writing-related issues with any ethical concerns. On the other hand, research has shown that experienced researchers spend more time working through decision-making processes related to ethical matters than do novices (Van Valey et al., 2015), so perhaps, novices' more conservative answers were less thoroughly considered than the assessments of their senior colleagues. Or, perhaps, experts have learned from personal experience that recycling text in some situations is common and acceptable in their area of research. It is even possible that experts' own practices do not align with the guidance they provide their mentees: Pemberton et al. (2019) found that editors who do not themselves object to some uses of text recycling in their own work sometimes encourage a more cautious approach to their graduate students out of a philosophy of risk aversion.

A final finding to highlight is that even those who believe that they know how to recycle appropriately may be open to education on the topic. (In fact, one of us regularly gives RCR talks on text recycling at their institution and these are among the most well attended of those offered.) Nevertheless, future efforts toward education and guidelines should be mindful of the tensions between the belief that one already understands text recycling and their desire for additional education on the topic.

This study suggests a number of fruitful avenues for further research. First, this study is based on a relatively small convenience sample. A larger, systematic sample may reveal disciplinary differences that we were not able to discern. Second, there are a number of important parameters that our survey (which was already quite lengthy) did not address, such as the role of attribution in the scenarios and the amount and content of researchers' RCR training.

Third, surveys are limited in the level of nuance they can extract, and text recycling is a highly nuanced topic. Anonymous focus group studies could reveal the sources of disagreements and reveal where apparent disagreements are the result of differing assumptions. And given the semi-taboo nature of the topic and the complex, collaborative nature of STEM research, much could be learned from sociological and anthropological investigations. Finally, there are other important populations to study. While this study was limited to the academic setting, we do not know how well our findings reflect those of researchers in government agencies and industry. Also, our study is limited to researchers currently in the United States; norms and beliefs in other countries may differ from our findings here.

Conclusion

This study is one in a series on beliefs and attitudes toward text recycling conducted by the Text Recycling Research Project (textrecycling.org).[6] Taken together, these studies reveal a lack of consensus about the acceptability of text recycling within groups of gatekeepers, experts, and novices, and this

work thus points toward the need for more research and discussion, leading toward clearer guidelines and more training for STEM writers. It is problematic that some STEM writers feel text recycling is disallowed when some editors and readers accept or appreciate it, and it is likewise problematic that some writers believe text recycling is acceptable in situations in which some editors and readers view it as a poor writing practice or even scientific misconduct. This situation wastes the time and energy of authors and editors while putting some authors' reputations at risk unnecessarily.

The current study showed that STEM researchers, both expert and novice, have good reason to be confused about text recycling. The growing use of plagiarism detection software puts pressure on these communities of practice to sort this out, but STEM scholars rarely possess the expertise to conduct research on the textual practices in their discourse communities. Scholars in writing studies, especially those who study science rhetoric and writing in the disciplines, can play an important role in helping to better understand and communicate the conditions under which text recycling is and is not acceptable practice, which will, in turn, support the development of more clear and consistent guidelines for editors and writers.

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Notes

1. This type of reuse often includes visual materials as well, such as using a diagram to illustrate an experimental apparatus or flowchart of a process. For practical reasons, we limit our scope in the present article to considerations of prose reuse.

2. For a discussion of recent debate over the definition, ethics, and practicalities of text recycling, see Moskovitz (2017, 2019).
3. See, for example, a description of a comprehensive program for RCR training of engineers, which notes that the discussion of plagiarism was the most popular part of the training but which omits any reference to the issue of self-plagiarism or text recycling (Newberry et al., 2011).
4. Confusingly, the term *self-plagiarism* is often used to describe both the practices we are discussing here and the different practice of students submitting the same piece of written work for multiple courses for credit; for readers interested in that topic, see Halupa and Bolliger (2013, 2015) and Halupa et al. (2016).
5. The authors of the present article are part of an NSF-funded research group working to understand attitudes toward text recycling, the nature and frequency of text recycling, and how copyright law intersects with this issue. To understand what kinds of guidance about text recycling should be provided to editors, reviewers, and authors, we need to understand more about their current practices and attitudes toward text recycling, as well as any relevant legal contexts for the practice. Members of our research group have previously probed the attitudes about text recycling held by academic publishing gatekeepers—journal editors and editorial board members. A complete, regularly updated list of the publications produced by our research group is available on our website: https://textrecycling.org/publications-2/
6. See also Pemberton et al. (2019).

Supplemental Material

Supplemental material for this article is available online.

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Susanne Hall is Campus Writing Coordinator and Lecturer in Writing at the Hixon Writing Center, California Institute of Technology. Dr. Hall is the founding co-editor of the open access journal *Prompt: A Journal of Academic Writing Assignments*. *In addition to her work on text recycling*, she is currently investigating how statistical analysis helps us understand who does and does not make use of college writing centers.

APPENDIX: Survey Instruments

EXPERT SURVEY

ABOUT THIS SURVEY

Text recycling refers to the reuse of excerpts (verbatim or nearly so) from previously published writing in a new publication without the use of quotation marks or other means to identify the material as reused. As academic journals have begun using new tools such as Turnitin/Ithenticate that allow manuscripts to be checked against previously published work, text recycling has become a source of considerable confusion and debate in the scientific research community. This study is part of a larger initiative investigating the ethics and acceptability of text recycling in different contexts and situations. It inquires about the attitudes and beliefs of academics across a broad spectrum of disciplines. You have been invited to participate in this study because you are a professional researcher in a STEM (Science, Technology, Engineering and Mathematics) field.

Start of Block: Personal information

What is your general field of research or work? (e.g., physics, biology, sociology, environmental science, medicine) _____

Which of these most closely fits the area of your primary area of research or work?

- Agriculture, Agriculture Operations, and Related Sciences (15)
- Natural Resources and Conservation (16)
- Communications Technologies/Technicians and Support Services (17)
- Computer and Information Sciences and Support Services (18)
- Engineering (19)
- Engineering Technologies/Technicians (20)
- Biological and Biomedical Sciences (21)
- Mathematics and Statistics (22)
- Military Technologies (23)
- Physical Sciences (24)
- Science Technologies/Technicians (25)
- Psychology (26)
- Social Sciences--interpretive (27)
- Social Sciences--quantitative (28)
- Health Professions—clinical (e.g., medicine, nursing, surgery) (29)
- Health Professions—basic science (e.g., hematology, pharmacology) (30)
- Other (31) _____

Which degrees do you hold?

- Masters (8)
- PhD (9)
- Doctoral (non-PhD) (10)
- MD (11)
- MD/PhD (12)
- Other (14) _____

What is your primary language (the one you most often speak at home)?

- Mandarin/Chinese (4)
- Spanish (5)
- English (6)
- Hindi (7)
- Arabic (8)
- Portuguese (9)
- Bengali (10)
- Russian (11)
- Japanese (12)
- Punjabi (13)
- German (14)
- Javanese (15)
- Malaysian/Indonesian (16)
- Vietnamese (17)
- Korean (18)
- French (19)
- Other (20) _____

Start of Block: PERSONAL INFORMATION

This first set of questions asks about your background and area of specialization.

In which of the following types of workplaces have you done research for at least 5 years?

Academic institution (1)

- Industry (2)
- Government institution (3)
- Non-profit (4)
- Other (5) _____

Which of the following best describes your **current** workplace?

- Academic institution (1)
- Industry (2)
- Government institution (3)
- Non-profit (4)
- Other (5) _____

Display This Question:
If Which of the following best describes your current workplace? = Academic institution

What is your academic rank or position?

- Full Professor (1)
- Associate Professor (2)
- Assistant Professor (3)
- Full-time, non-tenure-track faculty (4)
- Part-time or contingent non-tenure-track faculty (5)
- Emeritus faculty (6)
- Staff (7)
- Other (8) _____

Approximately how many scientific articles have you written--either alone or as a co-author? (Include only those for which you have been **directly** involved in the writing.)

- none (1)
- 1-10 (2)
- 11-20 (3)
- 21-50 (4)
- 50-100 (5)
- More than 100 (6)

Have you been the Editor of any academic journals? If so, how many?

- None (11)
- (6)
- (7)
- (8)
- (9)
- or more (10)

In which year were you born? _____

What is your primary language?

- Arabic (11)
- Chinese (7)
- English (4)
- French (8)
- German (6)
- Hindi (10)
- Japanese (9)
- Spanish (5)
- Other (12) _____

How would you describe your English language proficiency?

- excellent (1)
- good (2)
- fair (3)
- poor (4)

Start of Block: SCENERIOS

The next set of questions ask for your opinion regarding the appropriateness of recycling text in four different scenarios. The term “text recycling” as used here means reusing the exact (or nearly exact) language from an earlier paper in a subsequent manuscript with NO indication that the text was reused (no quotation marks, footnote, or citation identifying the reused text as such).

SCENARIO A: Sarah is a graduate student is doing research with an environmental science lab group. Prior to Sarah joining this group, the lab published an article, "Paper A," in an environmental science journal; this article included a description of a measurement apparatus—a combination of hardware and software for measuring carbon emissions from coal plants with drones. Since Sarah is using this same apparatus in her research, her advisor suggests that she recycle that description for the Methods section she is currently writing for "Paper B" in her work in this lab. Is this appropriate?

- Definitely appropriate (1)
- Probably appropriate (2)
- Probably NOT appropriate (3)
- Definitely NOT appropriate (4)

SCENARIO B: The following year, a different group of researchers at different university uses this same equipment set-up in a research project to study the movement of pollen from GM crops to non-GM fields. They recycle the description of the apparatus verbatim from Paper A. Is this appropriate?

- Definitely appropriate (1)
- Probably appropriate (2)
- Probably NOT appropriate (3)
- Definitely NOT appropriate (4)

SCENARIO C: Some time later, Sarah has completed her PhD and taken a faculty position at a different university. She is now collaborating with a new group of colleagues doing new studies on coal emissions.

	Definitely appropriate (1)	Probably appropriate (2)	Probably NOT appropriate (3)	Definitely NOT appropriate (4)
She recycles the apparatus description from Paper A (1)	○	○	○	○
She recycles the apparatus description from Paper B (2)	○	○	○	○

SCENARIO D: Later in her career, Sarah and a colleague named Karen have been collaborating on a research project. The two are asked by a major newspaper to co-author a story explaining their research for an audience of non-scientists. While drafting the piece, Sarah comes up with a really clever and insightful joke related to their research. It's one of her favorite parts of the story. A year later, Karen writes a "Commentary" which is published in a high profile scientific journal—and she recycles Sarah's joke, almost verbatim, from the newspaper story they wrote together.

- Definitely appropriate (1)
- Probably appropriate (2)
- Probably NOT appropriate (3)
- Definitely NOT appropriate (4)

Start of Block: SOURCE FOR TEXT RECYCLING

As a reminder, the term "text recycling" as used here means reusing the exact (or nearly exact) language from an earlier paper in a subsequent manuscript with NO indication that the text was reused (no quotation marks, footnote, or citation identifying the reused text as such).

Imagine you are currently writing a journal article (research report) in your field reporting on research you have been doing. This question asks for your opinion about text recycling when writing such an article--

depending on the source of the recycled material. Please respond with the choice that best aligns with your views.

	A. I can recycle material from this document as appropriate for the new paper without limits.	B. Recycling would be acceptable with some limitations.	C. This would never be acceptable.	I have no idea.
From my own GRANT PROPOSAL	○	○	○	○
From a GRANT PROPOSAL written by other members of my lab/research group	○	○	○	○
From a POSTER I presented at a professional conference	○	○	○	○
From a PAPER I presented at a professional conference	○	○	○	○
From a paper I presented at a professional conference that was published in CONFERENCE PROCEEDINGS	○	○	○	○
From a published JOURNAL ARTICLE for which I was one of the authors.	○	○	○	○
From a journal article I am writing at the same time as the article in question (to be submitted at nearly the same time).	○	○	○	○
From a published JOURNAL ARTICLE written by members of my lab/research group--but for which I was NOT an author	○	○	○	○
A published JOURNAL ARTICLE written neither by me nor those in my lab/research group.	○	○	○	○

The next prompts asks your opinion about the “acceptability” of text recycling from one of your prior publications--depending on the structural placement of the recycled material. Please respond with the choice that best aligns with your views.

For each section listed to the left, indicate whether you think that using recycled text in writing that section is acceptable in your area of research.

	A. Any amount of recycling in this section would be acceptable (1)	B. Recycling in this section would be acceptable with some limitations (2)	C. Recycling in this section would never be acceptable (3)	I have no idea (4)
Abstract (1)	○	○	○	○
Introduction (2)	○	○	○	○
Review of previous research (3)	○	○	○	○
Theory (4)	○	○	○	○
Methods (5)	○	○	○	○
Results (6)	○	○	○	○
Discussion (7)	○	○	○	○

You chose response 'B' for at least one of the prompts in the previous question. We'd like to know more about this. What is the maximum amount of material it that would be acceptable to recycle in these sections? (Choose the response that most closely matches your sensibilities.)

	a. 1 or 2 sentences (1)	b. About one paragraph (2)	c. 2-3 paragraphs (3)	d. No particular limit on amount of recycling (4)
Abstract (x1)	○	○	○	○
Introduction (x2)	○	○	○	○
Review of previous research (x3)	○	○	○	○
Theory (x4)	○	○	○	○
Methods (x5)	○	○	○	○
Results (x6)	○	○	○	○
Discussion (x7)	○	○	○	○

Start of Block: RECYCLING FROM WORK WITH MULTIPLE AUTHORS

The next questions ask whether you feel there are any differences in overall “acceptability” of text recycling when multiple authors have been involved in the creation of the source text. (For

these questions, please consider the practice of text recycling in general, not which specific part of a research paper it might be used in.)

For multiple-authored papers, text recycling is never acceptable.

- definitely true (1)
- probably true (2)
- Probably false (3)
- Definitely false (4)

For multiple-authored papers, text recycling is acceptable if the source text and the new paper have identical authors.

- definitely true (1)
- probably true (2)
- Probably false (3)
- Definitely false (4)

For multiple-authored papers, text recycling is acceptable if the source text and new text share at least one author and any other authors have given permission.

- definitely true (1)
- probably true (2)
- Probably false (3)
- Definitely false (4)

For multiple-authored papers, text recycling is acceptable if the person who originally “wrote” (drafted) the specific material being recycled is one of the authors of the new paper.

- definitely true (1)
- probably true (2)
- Probably false (3)
- Definitely false (4)

Members of a "lab" or long-term research project can recycle material from an earlier published paper produced by the same lab or project -- even if the authors of the two papers are not identical.

- definitely true (1)
- probably true (2)
- Probably false (3)
- Definitely false (4)

Start of Block: General opinions

For each of the following, indicate how strongly you agree with the given statement.

I understand how and when to recycle text ethically and properly in my work.

- Strongly agree (15)
- Somewhat agree (16)
- Neither agree nor disagree (17)
- Somewhat disagree (18)
- Strongly disagree (19)

I would benefit from explicit instruction regarding the ethics and conventions of text recycling for scientific writing.

- Strongly agree (15)
- Somewhat agree (16)
- Neither agree nor disagree (17)
- Somewhat disagree (18)
- Strongly disagree (19)

Before taking this survey I was aware that scientists sometimes recycle text.

- Strongly agree (15)
- Somewhat agree (16)
- Neither agree nor disagree (17)
- Somewhat disagree (18)
- Strongly disagree (19)

Novice Survey

ABOUT THIS SURVEY
Text recycling refers to the reuse of excerpts from previously published writing in a new publication without attributing the material to the prior work via quotation marks or citation. As academic journals have begun using new tools such as Turnitin/Ithenticate that allow manuscripts to be checked against previously published work, text recycling has become a source of considerable confusion and debate in the academic community. This study is part of a larger initiative investigating the ethics and acceptability of text recycling in different contexts and situations. It inquires about the attitudes and beliefs of academics across a broad spectrum of disciplines. You have been selected to participate in this study because you are a graduate student or post-doctoral researcher in a STEM (Science, Technology, Engineering and Mathematics) field.

Start of Block: Personal information

What is your general field of study? (e.g., physics, biology, sociology, environmental science, medicine)

Which of these most closely fits the area of your primary research/scholarship?

- Agriculture, Agriculture Operations, and Related Sciences (15)
- Natural Resources and Conservation (16)
- Communications Technologies/Technicians and Support Services (17)
- Computer and Information Sciences and Support Services (18)
- Engineering (19)
- Engineering Technologies/Technicians (20)
- Biological and Biomedical Sciences (21)
- Mathematics and Statistics (22)
- Military Technologies (23)
- Physical Sciences (24)
- Science Technologies/Technicians (25)
- Psychology (26)
- Social Sciences--interpretive (27)
- Social Sciences--quantitative (28)
- Health Professions—clinical (e.g., medicine, nursing, surgery) (29)
- Health Professions—basic science (e.g., hematology, pharmacology) (30)
- Other (31) _____

Which degree are you currently pursuing?

- Masters (8)
- PhD (9)
- Doctoral (non-PhD) (10)
- MD (11)
- MD/PhD (12)
- Current Post-Doc (13)
- Other (14) _____

Which of these best describes your current status?

- Post-doc (4)
- Completed coursework; working on thesis/dissertation (5)
- Have not yet completed coursework; working on thesis/dissertation (6)
- Primarily doing coursework; have not yet begin serious work on my thesis or dissertation (7)

Which degrees do you already hold? (Check all that apply.)

- Bachelor's (11)
- Masters (12)
- PhD (13)
- Doctoral (non-PhD) (14)
- JD (15)
- MBA (16)
- MD (17)
- Other (18) _____

Have you *directly participated* in the writing of any scientific articles--either published or submitted? If so, how many?

- none (11)
- (12)
- (13)
- 3-5 (14)
- 6-10 (15)
- more than 10 (16)

Have you given any conference talks? If so, how many?

- none (11)
- (12)
- (13)
- 3-5 (14)
- 6-10 (15)
- more than 10 (16)

In which country were you born?

In which country did you get your primary undergraduate degree?

In which country are you currently in school or employed?

Is English one of your native languages?

- Yes (1)
- No (2)

What is your primary language (the one you most often speak at home)?

- Mandarin/Chinese (4)
- Spanish (5)
- English (6)
- Hindi (7)
- Arabic (8)
- Portuguese (9)
- Bengali (10)
- Russian (11)
- Japanese (12)
- Punjabi (13)
- German (14)
- Javanese (15)
- Malaysian/Indonesian (16)
- Vietnamese (17)
- Korean (18)
- French (19)
- Other (20) _____

What is the name of the college or university where you are studying/working?

Start of Block: SCENERIOS

The next set of questions ask for your opinion regarding the appropriateness of recycling text in four different scenarios. The term “text recycling” as used here means reusing the exact (or nearly exact) language from an earlier paper in a subsequent manuscript with NO indication that the text was reused (no quotation marks, footnote, or citation identifying the reused text as such).

SCENARIO A: You are a graduate student doing research with an environmental science lab group. Before you joined this group, the lab published an article -- "Paper A" --in an environmental science journal that included a description of a measurement apparatus—a combination of hardware and software for measuring carbon emissions from coal plants with drones. Your advisor suggests that you recycle that description for the Methods section you are currently writing for "Paper B" in your work with this lab group. Is this appropriate?

- Definitely appropriate (1)
- Probably appropriate (2)
- Probably NOT appropriate (3)
- Definitely NOT appropriate (4)

SCENARIO B: The following year, a different group of researchers at a different university uses this same equipment set-up in a research project to study the movement of pollen from GM crops to non-GM fields. They recycle the description of the apparatus verbatim from Paper A. Is this appropriate?

- Definitely appropriate (1)
- Probably appropriate (2)
- Probably NOT appropriate (3)
- Definitely NOT appropriate (4)

SCENARIO C: Some time later you have completed your PhD and taken a faculty position at a different university. Now you are collaborating with a new group of colleagues doing new studies on coal emissions.

	Definitely appropriate (1)	Probably appropriate (2)	Probably NOT appropriate (3)	Definitely NOT appropriate (4)
You recycle the apparatus description from Paper A (1)	○	○	○	○
You recycle the apparatus description from Paper B (2)	○	○	○	○

SCENARIO D: Later in your career you and a colleague named Karen have been collaborating on a research project. The two of you are asked by a major newspaper to co-author a story explaining your research for an audience of non-scientists. While drafting the piece, you come up with a really clever and insightful joke related to your research. It's one of your favorite parts of the story. A year later, Karen writes a "Commentary" which is published in a high profile scientific journal—and she recycles "your" joke, almost verbatim from the newspaper story you wrote together.

- Definitely appropriate (1)
- Probably appropriate (2)
- Probably NOT appropriate (3)
- Definitely NOT appropriate (4)

Start of Block: SOURCE FOR TEXT RECYCLING

As a reminder, the term "text recycling" as used here means reusing the exact (or nearly exact) language from an earlier paper in a subsequent manuscript with NO indication that the text was reused (no quotation marks, footnote, or citation identifying the reused text as such).

Imagine you are currently writing a journal article (research report) in your field reporting on research you have been doing. This question asks for your opinion about text recycling when writing such an

article--depending on the source of the recycled material. Please respond with the choice that best aligns with your views.

	A. I can recycle material from this documen as appropriate for the new paper without limits. (1)	B. Recycling would be acceptable with some limitations (2)	C. This would never be acceptable (3)	I have no idea (4)
From my own GRANT PROPOSAL	○	○	○	○
From a GRANT PROPOSAL written by my mentor or lab/research group	○	○	○	○
From a POSTER I presented at a professional conference	○	○	○	○
From a PAPER I presented at a professional conference	○	○	○	○
A paper I presented at a professional conference that was published in CONFERENCE PROCEEDINGS	○	○	○	○
A published JOURNAL ARTICLE for which I was an author	○	○	○	○
A journal article I am writing at the same time as the article in question (to be submitted at nearly the same time).	○	○	○	○
A published JOURNAL ARTICLE written by my mentor or lab/research group--but for which I was NOT an author	○	○	○	○
A published JOURNAL ARTICLE written neither by me nor my mentor or those in my lab/research group.	○	○	○	○

The next prompts asks your opinion about the “acceptability” of text recycling depending on the structural placement of the recycled material or the rhetorical aim (or purpose) of the recycled material. There will likely be some overlap between these two categories, but please answer each question as best you can. Please respond with the choice that best aligns with your views.

For each section listed to the left, indicate whether you think that using recycled text in writing that section is acceptable in your area of research.

	A. Any amount of recycling in this section would be acceptable (1)	B. Recycling in this section would be acceptable with some limitations (2)	C. Recycling in this section would never be acceptable (3)	I have no idea (4)
Abstract (1)	○	○	○	○
Introduction (2)	○	○	○	○
Review of previous research (3)	○	○	○	○
Theory (4)	○	○	○	○
Methods (5)	○	○	○	○
Results (6)	○	○	○	○
Discussion (7)	○	○	○	○

You chose response 'B' for at least one of the prompts in the previous question. We'd like to know more about this. What is the maximum amount of material that would be acceptable to recycle in these sections? (Choose the response that most closely matches your sensibilities.)

	a. 1 or 2 sentences (1)	b. About one paragraph (2)	c. 2-3 paragraphs (3)	d. No particular limit on amount of recycling (4)
Abstract (x1)	○	○	○	○
Introduction (x2)	○	○	○	○
Review of previous research (x3)	○	○	○	○
Theory (x4)	○	○	○	○
Methods (x5)	○	○	○	○
Results (x6)	○	○	○	○
Discussion (x7)	○	○	○	○

Start of Block: RECYCLING FROM WORK WITH MULTIPLE AUTHORS

The next questions ask whether you feel there are any differences in overall "acceptability" of text recycling when multiple authors have been involved in the creation of the source text. (For these questions, please consider the practice of text recycling in general, not in which specific part of a research paper it might be used in.)

For multiple-authored papers, text recycling is never acceptable.

- Definitely true (1)
- Probably true (2)
- Probably false (3)
- Definitely false (4)

For multiple-authored papers, text recycling is acceptable if the source text and the new paper have identical authors.

- Definitely true (1)
- Probably true (2)
- Probably false (3)
- Definitely false (4)

For multiple-authored papers, text recycling is acceptable if the source text and new text share at least one author and any other authors have given permission.

- Definitely true (1)
- Probably true (2)
- Probably false (3)
- Definitely false (4)

For multiple-authored papers, text recycling is acceptable if the person who originally “wrote” (drafted) the specific material being recycled is one of the authors of the new paper.

- Definitely true (1)
- Probably true (2)
- Probably false (3)
- Definitely false (4)

Members of a "lab" or long-term research project can recycle material from an earlier published paper produced by the same lab or project -- even if the authors of the two papers are not identical.

- Definitely true (1)
- Probably true (2)
- Probably false (3)
- Definitely false (4)

Start of Block: General opinions

For each of the following, indicate how strongly you agree with the given statement.

I understand how and when to recycle text ethically and properly in my work.

- Strongly agree (15)
- Somewhat agree (16)
- Neither agree nor disagree (17)
- Somewhat disagree (18)
- Strongly disagree (19)

I would benefit from explicit instruction regarding the ethics and conventions of text recycling for scientific writing.

- Strongly agree (15)
- Somewhat agree (16)
- Neither agree nor disagree (17)
- Somewhat disagree (18)
- Strongly disagree (19)

Before taking this survey I was aware that scientists sometimes recycle text.

- Strongly agree (15)
- Somewhat agree (16)
- Neither agree nor disagree (17)
- Somewhat disagree (18)
- Strongly disagree (19)