

Avoiding plagiarism, self-plagiarism, and other questionable writing practices: A guide to ethical writing
Miguel Roig, Ph.D.

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Please send any questions, comments, or suggestions to [Miguel Roig, Ph.D](mailto:roigm@stjohns.edu)
(roigm@stjohns.edu)

PREFACE

In recognizing the importance of educating aspiring scientists in the responsible conduct of research (RCR), the [Office of Research Integrity](#) (ORI) began sponsoring the creation of instructional resources to address this pressing need in 2002. The present guide on avoiding plagiarism and other inappropriate writing practices was created to help students, as well as professionals, identify and prevent such malpractices and to develop an awareness of ethical writing and authorship. This guide is one of the many products stemming from ORI's effort to promote the RCR.

Many other writing guides are available to assist scientists in preparing their research reports for publication in scholarly and scientific outlets. Some of these resources focus on matters of scientific style and are written for those who are completing theses and/or dissertations. Other guides target professionals and focus on topics, such as the traditional Introduction, Methods, Results, [and] Discussion (IMRAD) journal article and submission process, along with other elements of scientific publishing. Few writing guides, however, focus solely on issues related to responsible writing, an area that continues to receive increasing attention in part because of rapid changes occurring in science dissemination and globalization within the last few decades. The latter factor has resulted in the addition of increasing numbers of researchers whose primary language is not English, the *lingua franca* of science, who must struggle to function in a highly competitive research climate. The changes in science publishing that have taken place in recent years (e.g., open access movement) have also resulted in many more outlets for the publication of scientific research. At the same time, the emergence of so-called “predatory publishers” is thought to have also contributed to a decline in the quality of science that ultimately becomes part of the scientific record (Beal 2013; Clark & Smith, 2015). Because these and related factors are likely associated with questionable writing and authorship practices, ORI felt that an updated and more detailed treatment of the issues covered in the two previous versions of this guide was necessary. Thus, the current version is herein presented.

INTRODUCTION

Scientific writing can be a cognitively demanding and arduous process, for it simultaneously demands exceptional degrees of clarity and conciseness, two elements that often clash with each other. In addition, accuracy and transparency, fundamental aspects of the scientific enterprise are also critical components of scientific writing. Good

scientific writing must be characterized by clear expression, conciseness, accuracy, and perhaps most importantly, honesty. Unfortunately, modern scientific research often takes place within all sorts of constraints and competing pressures. As a result, a portion of the scientific literature, whether generated by students of science or by seasoned professionals, is likely to be deficient in one or more of the above components.

Insufficient clarity or lack of conciseness is typically unintentional and relatively easy to remedy by standard educational and/or editorial steps. Lapses in the accuracy of what is reported (e.g., faulty observations, incorrect interpretation of results) are also assumed to be most often unintentional in nature. Yet such lapses, even if unintentional, can have significant negative consequences if not corrected. Intentional lapses in research integrity represent the most serious threat to the scientific enterprise, for such misconduct runs contrary to the principal goal of science, which is the search for truth.

In scientific writing, plagiarism is perhaps the most serious and the most widely recognized ethical lapse. It can occur in many forms and some of the more subtle instances, while arguably unethical in nature, may not rise to the level of research misconduct by federal agencies such as the National Science Foundation (NSF) or the Office of Research Integrity (ORI). On the other hand, minor plagiarism may still result in serious negative consequences for the perpetrator as per institutional policies, those of professional associations *or* those of the publishers where the plagiarized material appears. Because members of the scientific community are held, or should be held, to the highest standards of excellence, they are expected to uphold those high standards across all facets of their scientific work. Consequently, they must be aware of, and actively avoid, all questionable research practices, including writing practices that might be considered ethically problematic. A relatively common example of the latter occurs when authors report and discuss the results of their research only in the context of literature that is supportive of their conclusions, but ignore literature that clearly runs contrary to their findings.

On ethical writing

A general principle underlying ethical writing is the notion that the written work of an author, be it a manuscript for a magazine or scientific journal, a research paper submitted for a course, or a grant proposal submitted to a funding agency, represents an implicit contract between the author of that work and his/her readers. Accordingly, the reader assumes that the author is the sole originator of the written work and that any material, text, data, or ideas borrowed from others is clearly identified as such by established scholarly conventions, such as footnotes, block-indented text, and quotations marks. The reader also assumes that all information conveyed therein is accurately represented to the best of the author's abilities. In sum, as Kolin (2015) points out, "Ethical writing is clear, accurate, fair, and honest" (p. 29) and its promotion conveys to readers a commitment to ethical practice in other aspects of the author's work.

As is the case with most other human activities, inadvertent errors may occur in the process of writing that end up violating the spirit of the contract. For example, in proposing a new idea or presenting new data, an author may sincerely consider a certain line of evidence as unimportant or irrelevant, and thus ignore other existing data or evidence that fail to support, or outright contradict, his/her own ideas. In other cases, an author may fail to give credit to a unique theoretical position or a fundamental methodological step that is necessary for an experiment to work as described. An example of the latter situation that eventually led to a correction of a published article (i.e., Anastasia, Deinhardt, Chao, Will, Irmady, Lee,

Hempstead, & Bracken, 2014) is described by Marcus (2014). Judging by some of the reader commentary appearing in various emerging outlets, such as PubPeer and Retraction Watch,, these types of oversights occur relatively frequently in the sciences, particularly when dealing with controversial topics.

Other errors include situations in which an idea claimed to be completely original by its author/s may have actually been articulated earlier by someone else. Such “rediscovery” of ideas is a relatively well-known phenomenon in the sciences, often occurring within a relatively close timeframe. In some cases, these “new” discoveries are completely independent in that it is possible for the new proponents to appear to have no knowledge of the original discovery. In other instances, it is possible for the new proponents to have been actually exposed to these ideas at some point but to have genuinely forgotten. A recent example of a rediscovery of an old phenomenon occurred when Dieter, Hu, Knill, Blake, and Tadin (2013) claimed to have discovered that moving one’s hand from side to side in front of one’s covered eyes causes visual sensations of motion. However, as a subsequent correction points out (Dieter, et al., 2014), these authors were apparently unaware that reports of this phenomenon had been published earlier, starting with the work of Hofstetter (1970) and followed by the work of Brosgole & Neylon (1973) and Brosgole & Roig (1983). The latter study reported at least one experiment with similar methodology and results as one of those reported later by Dieter, et al. Cognitive psychologists have provided considerable evidence for the existence of cryptomnesia, or unconscious plagiarism, which refers to the notion that individuals previously exposed to others’ ideas will often remember the idea, but not its source, and mistakenly misattribute the idea to them (see Brown & Murphy, 1989; Brown & Halliday, 1991; Marsh & Bower, 1993). Unfortunately, it is often difficult to establish whether prior exposure to ideas has occurred.

Other unintentional errors occur, such as when authors borrow heavily from a source and, in careless oversight, fail to fully credit the source. These and other types of inadvertent lapses are thought to occur with some frequency in the sciences. Unfortunately, in some cases, such lapses are thought to be intentional and therefore constitute instances of unethical writing and quite possibly constitute research misconduct. Without a doubt, plagiarism is the most widely recognized and one of the most serious violations of the contract between the reader and the writer. Moreover, plagiarism is one of the three major types of scientific misconduct as defined by the Public Health Service, the other two being falsification and fabrication (U. S. Public Health Service, 1989). Most often, individuals found to have committed substantial plagiarism pay a steep price. Plagiarists have been demoted, dismissed from their schools, from their jobs, and their degrees and honors have been rescinded as a result of their misdeeds (Standler, 2000). Let us take a closer look at this type of misconduct.

PLAGIARISM

"Taking over the ideas, methods, or written words of another, without acknowledgment and with the intention that they be taken as the work of the deceiver." American Association of University Professors (September/October, 1989).

As the above quotation shows, plagiarism has been traditionally defined as the taking of words, images, processes, structure and design elements, ideas, etc. of others and presenting them as one’s own. It is often associated with phrases such as kidnapping of words, kidnapping of ideas, fraud, and literary theft. Plagiarism can manifest itself in a

variety of ways and is not just confined to student papers or published articles or books. For example, consider a scientist who makes a presentation at a conference and discusses at length an idea or concept that had already been proposed by someone else yet not considered common knowledge. During his presentation, he fails to fully acknowledge the specific source of the idea and, consequently, misleads the audience into believing that he was the originator of that idea. This, too, may constitute an instance of plagiarism. The fact is that plagiarism manifests itself in a variety of situations and the following examples are just a small sample of the many ways in which it occurs and of the types of consequences that can follow as a result.

- A historian resigns from the Pulitzer board after allegations that she had appropriated text from other sources in one of her books.
- A writer for a newspaper who was found to have plagiarized material for some of his articles ended up resigning his position.
- A biochemist resigns from a prestigious clinic after accusations that a book he wrote contained appropriated portions of text from a National Academy of Sciences report.
- A famous musician is found guilty of unconscious plagiarism by including elements of another musical group's previously recorded song in one of his new songs which then becomes a hit. The musician is forced to pay compensation for the infraction.
- A college president is forced to resign after allegations that he failed to attribute the source of material that was part of a college convocation speech.
- A U.S. Senator has his Master's degree rescinded after findings of plagiarism in one of his academic papers; he withdraws from the Senate race.
- An education minister resigns her government position after a university rescinds her doctoral degree for plagiarism.
- A psychologist has his doctoral degree rescinded after the university finds that portions of his doctoral dissertation had been plagiarized.

In sum, plagiarism can be a very serious form of ethical misconduct. For this reason, the concept of plagiarism is universally addressed in all scholarly, artistic, and scientific disciplines. In the humanities and the sciences, for example, a plethora of writing guides for students and professionals exist to provide guidance to authors on discipline-specific procedures for acknowledging the contributions of others.

While instruction on proper attribution, a key concept in avoiding plagiarism, is almost always provided, coverage of this important topic often fails to go beyond the most common forms: plagiarism of ideas and plagiarism of text.

Plagiarism of ideas

Appropriating someone else's idea (e.g., an explanation, a theory, a conclusion, a hypothesis, a metaphor) in whole or in part, or with superficial modifications without giving credit to its originator.

In the sciences, as in most other scholarly endeavors, ethical writing demands that any ideas, data, and conclusions borrowed from others and used as the foundation of one's own contributions to the literature, be properly acknowledged. The specific manner in which we make such acknowledgement may vary depending on the context

and even on the discipline, but it often takes the form of either a footnote or a reference citation.

Acknowledging the source of our ideas

Just about every scholarly or scientific paper contains several footnotes or references documenting the source of the facts, ideas, or evidence used in support of arguments, hypotheses, etc. In some cases, as in those papers that review the literature in a specific area of research, the reference section listing the sources cited in the paper can be quite extensive, sometimes taking up more than a third of the published article (see, for example, Logan, Walker, Cole, & Leukefeld, 2002). Most often, the contributions we rely upon come from the published work or personal observations of other scientists or scholars. On occasion, however, we may derive an important insight about a phenomenon or process that we are studying, through a casual interaction with an individual not at all connected with scholarly or scientific work. But, even in such cases, we still have a moral obligation to credit the source of our ideas. A good illustrative example of the latter point was reported by Alan Gilchrist in a 1979 *Scientific American* article on color perception. In a section of the article which describes the perception of rooms uniformly painted in one color, Gilchrist states: “We now have a promising lead to how the visual system determines the shade of gray in these rooms, although we do not yet have a complete explanation. (John Robinson helped me develop this lead.)” (p. 122; Gilchrist, 1979). The reader might assume that Mr. Robinson is another scientist working in the field of visual perception, or perhaps an academic colleague or an advanced graduate student of Gilchrist’s. Not so. John Robinson was a local plumber and an acquaintance of Gilchrist in the town where the author spent his summers. During a casual discussion between Gilchrist and Robinson over the former’s work, Robinson provided insights into the problem that Gilchrist had been working on that were sufficiently important to the development of his theory of lightness perception that Gilchrist felt ethically obligated to credit Robinson’s contribution.

Unconscious plagiarism of ideas. Even the most ethical authors can fall prey to the inadvertent appropriation of others’ ideas, concepts, or metaphors. Here we are again referring to the phenomenon of unconscious plagiarism (i.e., cryptomnesia), which, as noted earlier, takes place when an author generates an idea that s/he believes to be original, but which in reality had been encountered at an earlier time. Given the free and frequent exchange of ideas in science and other scholarly disciplines, it is not unreasonable to expect instances in which earlier exposure to an idea that lies dormant in someone’s unconscious emerges into consciousness at a later point, but in a context different from the one in which the idea had originally occurred. Presumably, this is exactly what happened in the case of former Beatle George Harrison, whose song “My Sweet Lord” was found to have musical elements of the song “He’s So Fine,” which had been released years earlier by The Chiffons (see *Bright Tunes Music Corp. v. Harrisongs Music, Ltd.*, 1976). One has to wonder how many other John Robinsons, as well as other accomplished scientists, scholars, and artists, now forgotten, contributed original ideas without acknowledgement.

Some instances of misappropriation of ideas suggest intentionality on the part of the perpetrators. For example, according to Resnik (e.g., Shamo and Resnik, 2009; Resnik 2012), many instances exist in which professors take ideas from their students but fail to give them credit for their contributions. Ferguson (2014) describes a case of this type in which a mathematics paper published in 2013 was retracted the following year

because it been determined that the work had been largely derived from a student's Master's thesis without any acknowledged of her contributions.

In other cases the misappropriation of an idea can be a subtle process. Consider the famous case of Albert Schatz who, as a graduate student working under Selman Waksman at Rutgers, discovered the antibiotic streptomycin. Even though the first publications describing his discovery identified Schatz as primary author (Martin, 1997), it was Wakman who, over a period of time, began to take sole credit for the discovery, ultimately earning him the Nobel prize in 1952 (see, for example, Shatz, 1993; Mistiaen, 2002 for a fuller description of this case).

The confidential peer review process is thought to be a common source of plagiarism. Consider the scenario where the offender is a journal or conference referee, or a member of a review panel for a funding agency. He reads a paper or a grant proposal describing a promising new methodology in an area of research directly related to his own work. The grant fails to get funded based perhaps on his negative evaluation of the protocol. He then goes back to his lab and prepares a grant proposal using the methodology stolen from the proposal that he refereed earlier and submits his proposal to a different granting agency. Cases similar to the above scenario have been documented in the research misconduct literature (see Price, 2006)

Most of us would deem the behavior depicted in the above scenario as downright despicable. Unfortunately, similar situations have occurred. In fact, elements of the above scenario are based on actual cases of scientific misconduct investigated by ORI. The notion that the peer review context appears to be sufficiently susceptible to the appropriation of ideas was likely the impetus behind the 1999 Federal Office of Science and Technology Policy's expansion of their definition of plagiarism, which states:

"Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit, including those obtained through confidential review of others' research proposals and manuscripts." (Office of Science and Technology Policy, 1999).

And, even small-scale plagiarism of ideas may lead to very negative consequences. (See, for example, Abbott, 2009).

Guideline 1: An ethical writer ALWAYS acknowledges the contributions of others to his/her work.

Plagiarism of text

Copying a portion of text from another source without giving appropriate credit to its author.

When it comes to using others' word-for-word (i.e., verbatim) text in our writing the universally accepted rule is to enclose that information in quotations and to indicate the specific source of that text. When quoting text from other sources, a writer must provide a reference citation and, depending on the style manual that guides the work (e.g., Turabian, American Psychological Association [APA], American Medical Association [AMA]), the page number indicating where the quoted text is located in the original.

Although the use of direct quotes appears to be uncommon in biomedical literature, in some instances it may be warranted. The material quoted earlier from Gilchrist (1979) serves as a good example of when to use quotations. Some writing style manuals require that larger portions of text that are borrowed be block-indented. For example quoting directly from Iverson, et al (2007; p. 361):

Block Quotations. – If material quoted from texts or speeches is longer than 4 typewritten lines. The material should be set off in a block, i.e., in reduced type and without the quotation mark. Paragraph indents are generally not used unless the quoted material is known to begin a paragraph. Space is often added both above and below these longer quotations.

Although the evidence indicates that most authors, including college students, are aware of rules regarding the use of quotation marks, plagiarism of text is probably the most common type of plagiarism. For example, some authors seem to believe that as long as a citation is provided, it is acceptable to use verbatim text from another source without needing to enclose the borrowed material in quotation marks (Julliard, 1993). However, plagiarism of text can occur in a variety of forms. The following review will familiarize the reader with the various subtle forms of plagiarism of text.

Guideline 2: Any verbatim text taken from another source must be enclosed in quotation marks and be accompanied by a citation to indicate its origin.

Let's consider the following variety:

Copying portions of text from one or more sources, inserting and/or deleting some of the words, or substituting some words with synonyms, but never giving credit to its author nor enclosing the verbatim material in quotation marks.

The above form of plagiarism is relatively well known and has been given names, such as patchwriting (Howard, 1999) and paraphragiarism (Levin & Marshall, 1993). Iverson, et al. (2007) in the American Medical Association's Manual of Style identify this type of unethical writing practice as mosaic plagiarism and they define it as follows:

“Mosaic: Borrowing the ideas and opinions from an original source and a few verbatim words or phrases without crediting the original author. In this case, the plagiarist intertwines his or her own ideas and opinions with those of the original author, creating a ‘confused plagiarized mass’” (p. 158).

Another, more blatant form which may also fall under the more general category of plagiarism of ideas occurs when an author takes a portion of text from another source, thoroughly paraphrases it, but never gives credit to its author. Consistent with the first guideline, we must be careful to indicate which ideas/material in our writing have been derived from which source.

Inappropriate paraphrasing

Taking portions of text from one or more sources, crediting the author/s, but only

making ‘cosmetic’ changes to the borrowed material, such as changing one or two words, simply rearranging the order, voice (i.e., active vs. passive) and/or tense of the sentences is NOT paraphrasing.

Inappropriate paraphrasing is perhaps the most common form of plagiarism and, at the same time, the most controversial. This is because the criteria for what constitutes proper paraphrasing differ between individuals, even within the same discipline (Roig, 2001). We will discuss these issues shortly, but first let’s consider the process of paraphrasing.

Paraphrasing and summarizing

Scholarly writing, including scientific writing, often involves **paraphrasing** and **summarizing** others’ work. For example, in the introduction of a traditional IMRAD paper it is customary to provide a brief and concise review of the pertinent literature. Such a review is accomplished by the cogent synthesis of relevant theoretical and empirical studies that form the background and rationale for the hypotheses being tested or for the main thesis of the paper being written. Such reviews call for the synthesis (i.e., summarizing) of relatively large amounts of information.

Guideline 3: When we summarize others’ work, we use our own words to condense and convey others’ contributions in a shorter version of the original.

At other times, and for a variety of reasons, we may wish to restate in detail and in our own words a certain portion of another author’s writing. In this case, we must rely on the process of paraphrasing. Unlike a summary, which results in a substantially shorter textual product, a paraphrase usually results in writing of roughly equivalent textual length as the original, but, of course, with different words and sentence structure. Whether paraphrasing or summarizing others’ work, we must always provide proper credit.

Guideline 4: When paraphrasing others’ work, not only must we use our own words, but we must also use our own syntactical structure.

Guideline 5: Whether we are paraphrasing or summarizing we must always identify the source of our information.

Paraphrasing and plagiarism: what the writing guides say

Although virtually all professional and student writing guides, including those in the sciences, provide specific instructions on the proper use of quotation marks, references, etc., some fail to offer specific details on proper paraphrasing. With some exceptions, writing guides that provide instructions for proper paraphrasing and for avoiding plagiarism tend to subscribe to a “conservative” approach to paraphrasing. That is, these guides often suggest that when paraphrasing, an author must substantially modify the original material. Consider the following examples of paraphrasing guidelines:

“Don’t plagiarize. Express your own thoughts in your own words.... Note, too, that simply changing a few words here and there, or changing the order of a few words in a sentence or paragraph, is still plagiarism. Plagiarism is one of the most serious crimes in academia.” (Pechenik, 2001; p.10).

“You paraphrase appropriately when you represent an idea in your own words more clearly and pointedly than the source does. But readers will think that you plagiarize if they can match your words and phrasing with those of your source.” (Booth, Colomb, & Williams, 2008; p. 194).

Guideline 6: When paraphrasing and/or summarizing others’ work we must ensure that we are reproducing the exact meaning of the other author’s ideas or facts and that we are doing so using our own words and sentence structure.

Examples of paraphrasing: good and bad

The ethical writer takes great care to insure that any paraphrased text is sufficiently modified so as to be judged as new writing. Let’s consider various paraphrased versions of the following material on the electrochemical properties of neurons (taken from Martini & Bartholomew, 1997). In acknowledging the source, we will use the footnote method commonly used in the biomedical sciences. The actual reference would appear in the reference section of the paper.

“Because the intracellular concentration of potassium ions is relatively high, potassium ions tend to diffuse out of the cell. This movement is driven by the concentration gradient for potassium ions. Similarly, the concentration gradient for sodium ions tends to promote their movement into the cell. However, the cell membrane is significantly more permeable to potassium ions than to sodium ions. As a result, potassium ions diffuse out of the cell faster than sodium ions enter the cytoplasm. The cell therefore experiences a net loss of positive charges, and as a result the interior of the cell membrane contains an excess of negative charges, primarily from negatively charged proteins.”¹ (p. 204).

Here is an Appropriate Paraphrase of the above material:

A textbook of anatomy and physiology¹ reports that the concentration of potassium ions inside of the cell is relatively high and, consequently, some potassium tends to escape out of the cell. Just the opposite occurs with sodium ions. Their concentration outside of the cell causes sodium ions to cross the membrane into the cell, but they do so at a slower rate. According to these authors, this is because the permeability of the cell membrane is such that it favors the movement of potassium relative to sodium ions.

Because the rate of crossing for potassium ions that exit the cell is higher than that for sodium ions that enter the cell, the inside portion of the cell is left with an overload of negatively charged particles, namely, proteins that contain a negative charge.

Notice that, in addition to thoroughly changing much of the language and some of the structure of the original paragraph, the paraphrase also indicates, as per guideline 5, that the ideas contained in the rewritten version were taken from another source. When we paraphrase and/or summarize others' work we must also give them due credit, a rule not always applied by inexperienced writers.

Let's suppose that instead of paraphrasing, we decide to summarize the above paragraph from Martini and Bartholomew. Here is one summarized version of that paragraph:

The interior of a cell maintains a negative charge because more potassium ions exit the cell relative to sodium ions that enter it, leaving an overabundance of negatively charged protein inside of the cell.¹

In their attempts at paraphrasing, some authors commit "near plagiarism" (or plagiarism, depending on who is doing the judging) because they fail to sufficiently modify the original text and, thus, produce an inappropriately paraphrased version. Depending on the extent of modifications to the original, the amount of text involved, and the unique perspective of the reader about what constitutes ethical scholarship, inappropriate paraphrasing may constitute an instance of plagiarism. For example, the following versions of the Martini and Bartholomew paragraph inappropriately paraphrased-and can thus be classified as plagiarized.

Inappropriate paraphrase (version 1):

Because the intracellular concentration of potassium ions is _ high, potassium ions tend to diffuse out of the cell. This movement is triggered by the concentration gradient for potassium ions. Similarly, the concentration gradient for sodium ions tends to promote their movement into the cell. However, the cell membrane is much more permeable to potassium ions than to it is to sodium ions. As a result, potassium ions diffuse out of the cell more rapidly than sodium ions enter the cytoplasm. The cell therefore experiences a _ loss of positive charges, and as a result the interior of the cell membrane contains a surplus of negative charges, primarily from negatively charged proteins.¹ (p. 204).

A comparison between the original version of the Martini and Bartholomew paragraph to the 'rewritten' version above reveals that the rewritten version is a mere copy of the original. The few modifications that were made are superficial, consisting merely of a couple of word deletions, substitutions, and additions. Even though the writer has credited Martini and Bartholomew's ideas by the insertion of a reference note (1), most of the words and structure of the original paragraph are preserved in the rewritten version and the paragraph is, therefore, considered plagiarism. In other words, making only cosmetic modifications to others' writing misleads the reader as to who the true author of the original writing really is.

Inappropriate paraphrase (version 2):

The concentration gradient for sodium (Na) ions tends to promote their movement into the cell. Similarly, the high intracellular concentration of potassium (K) ions is relatively high resulting in K's tendency to diffuse out of the cell. Because the cell membrane is significantly more permeable to K than to Na, K diffuses out of the cell faster than Na enters the cytoplasm. The cell therefore experiences a net loss of positive charges and, as a result the interior of the cell membrane now has an excess of negative charges, primarily from negatively charged proteins.¹ (p. 204).

At first glance this second 'rewritten' version may look as if it has been significantly modified from the original but, in reality, the changes made are only superficial and the resulting paraphrase is not all that different from original. In this particular instance, the writer has made a seemingly disingenuous change by substituting the names of the atoms with their chemical symbols (e.g., sodium = Na). In addition, the order of the first two sentences was changed giving the appearance of a substantial modification. As in the previous version, however, the language and much of the rest of structure is still too close to the original.

Again, it must be emphasized that when we paraphrase we must make every effort to restate the ideas in our own voice. Obviously, certain key terms, such as specific cellular structures (e.g., membrane) and molecules (e.g., sodium) cannot be changed. This will be often the case with precise terminology of a scientific nature for which there are no adequate substitutes. Here is another properly paraphrased version:

Appropriate paraphrase (version 2):

The relatively high concentration gradient of sodium ions outside of the cell causes them to enter into the cell's cytoplasm. In a similar fashion, the interior concentration gradient of potassium ions is also high and, therefore, potassium ions tend to scatter out of the cell through the cell's membrane. But, a notable feature of this process is that Potassium ions tend to leave the cell faster than sodium ions enter the cytoplasm. This is because of the nature of the cell membrane's permeability, which allows potassium ions to cross much more freely than sodium ions. The end result is that the interior of the cell membrane's loss of positive charges results in a greater proportion of negative charges and these are made up mostly of proteins that have acquired a negative charge.¹

Paraphrasing highly technical language

Taking a paragraph, or for that matter, even a unique sentence from another source, and using it in our own writing without enclosing the material in quotations constitutes plagiarism. Similarly, inappropriate paraphrasing may also be classified as plagiarism.

The available evidence indicates that one of the reasons writers misappropriate text is because they may be unfamiliar with the concepts and/or language with which s/he is working. The ability to properly paraphrase technical text depends in large part on an author's conceptual understanding of the material and his/her mastery and command of the

language and of her knowledge of, and ability, to convey discipline-specific expressions typically used to describe relevant phenomena, laboratory processes and procedures, etc. Accordingly, it is relatively easy to thoroughly paraphrase others' work when we have a full grasp of the issues and of the language involved. For example, studies show that when asked to paraphrase a short paragraph, students (Roig, 1999; Walker, 2008) as well as university professors (Roig 2001) are more likely to appropriate and, therefore, plagiarize text when the original material to be paraphrased is made up of technical language likely to be unfamiliar to them, than when the topic is a familiar one and the original is written in plain language.

Obviously, inexperienced writers (e.g., students) have the greatest difficulty paraphrasing the advanced technical text often found in the primary scientific literature. In an effort to introduce them to primary sources of information in a given discipline, college students are often required to write a research paper from articles published in professional journals. For those students who must complete this type of assignment for the first time, and, in particular for foreign students whose primary language is not English, writing a research paper can be a daunting task. This is because scholarly prose: 1) can be very intricate, 2) adheres to unique stylistic conventions (e.g., use of the passive voice in the biomedical sciences), and 3) relies heavily on jargon and unusual expressions that novice writers have yet to master. Consequently, students need to create an acceptable academic product that is not only grammatically correct, but also demonstrates knowledge of the concepts discussed. These circumstances force many such students to rely on close paraphrases of the original text. Unfortunately, such writing can result in a charge of plagiarism.

Guideline 7: In order to be able to make the types of substantial modifications to the original text that result in a proper paraphrase, one must have a thorough command of the language and a good understanding of the ideas and terminology being used.

An analogous situation can occur at the professional level when authors see the need to paraphrase a complex process or methodology. As indicated earlier, traditional scholarly conventions provide us with the option to re-use any material by enclosing it in quotation marks or by block-quoting it (i.e., indenting the material within both margins) with some type of indication (e.g., a footnote) as to its origin. Therefore, if the text is so technical that it would be very difficult or nearly impossible to modify substantially without altering its meaning, then perhaps it would be best to leave it in the original author's wording, enclose it in quotation marks (or block-quote it), and include a citation. However, unlike literature or philosophy, quoting in certain disciplines (e.g., biomedical sciences) is not encouraged (see Pechnick, 2001). One would be hard pressed to find an entire sentence quoted, let alone a short paragraph, in the pages of prestigious biomedical journals (e.g., *Nature*, *Science*, *New England Journal of Medicine*).

In sum, the reality is that in many instances, scientific prose and diction can be very difficult to paraphrase. To illustrate the difficulties inherent in paraphrasing highly technical language, let's consider the following paragraph from a report recently published in *Science* (Lunyak, et al., 2002).

“Mammalian histone lysine methyltransferase, suppressor of variegation 39H1 (SUV39H1), initiates silencing with selective methylation on Lys⁹ of histone H3, thus creating a high-affinity binding

site for HP1. When an antibody to endogenous SUV39H1 was used for immunoprecipitation, MeCP2 was effectively coimmunoprecipitated; conversely, α HA antibodies to HA-tagged MeCP2 could immunoprecipitate SUV39H1 (Fig. 2G)."² (p. 1748)

Here is an attempt at paraphrasing the above material:

The H3 methyltransferase SUV39H1 mediates gene silencing of neuronal genes in Rat-1 fibroblasts by methylating lysine 9 of histone H3, thus creating a binding site for the heterochromatin protein HP1 and subsequent formation of a chromatin complex involving multiple silencing factors including the methyl-CpG-binding protein MeCP2 and SUV39H1 itself (Lunyak, et al., 2002).¹

Unlike the previous examples of appropriate paraphrasing, the above example does not embody as many textual modifications. In order for the exact meaning of the original *Science* paragraph to be preserved in the present case, many of the same terms must be left intact in the paraphrased version. Although synonyms for some of the words may be available, their use in the specific context of the original paragraph is simply not appropriate. For example, take the word *affinity*, which is defined as “that force by which a substance chooses or elects to unite with one substance rather than with another” (Dorland, 2000) or, in its more recent edition, “a special attraction for a specific element, organ or structure” (Dorland, 2011). *Roget’s Thesaurus* (Moorhead, 2002) lists the following synonyms for *affinity*: *liking, attraction, relations, similarity*. Although it might be possible to rewrite the first sentence using the synonym “*attraction*,” this alternative fails to capture the precise meaning conveyed by the original sentence, given how the term is used in this area of biomedical research. The word *affinity* has a very specific denotation in the context in which is being used in the *Science* paragraph and it is the only practical and meaningful alternative available. The same can be said for other words that might have synonyms (e.g., binding, silencing, site). Other terms, such as *methylation* and *antibodies* are unique and do not have synonyms. In sum, most of the rest of the technical terms (e.g., immunoprecipitation, endogenous, coimmunoprecipitated) and expressions (e.g., HA-tagged, high-affinity, mammalian histone lysing methyltransferase) in the above paragraph are extremely difficult, if not impossible, to substitute without altering the intended meaning of the paragraph. As a result, a properly paraphrased version such as the one offered above will share many common elements with the original and thus, applying the strict definitions of paraphrasing provided by some writing guides might render the above paraphrase as a borderline, or an outright, case of plagiarism.

It may be worth noting that the “correct paraphrase” version of the Lunyak, et al (2002) paragraph that had been included in the previous version of this guide and which is reproduced immediately below had been written by a nonspecialist in that field and contained a subtle misinterpretation of the processes described in the original material paragraph:

A high affinity binding site for HP1 can be produced by silencing Lys⁹ of histone H3 by methylation with mammalian histone lysine methyltransferase, a suppressor of variegation 39H1 (SUV39H1). MeCP2 can be immunoprecipitated with antibodies prepared against endogenous SUV39H1; on the other hand, immunoprecipitation of SUB39H1 resulted from α HA antibodies to HA-tagged MeCP2. ²

¹ Paraphrased version prepared by John Rodgers.

Such subtle misrepresentations illustrates the fact that highly technical descriptions of a methodology, phenomena, etc., can be extremely difficult to properly paraphrase and, to do so, a writer must have a thorough conceptual understanding of the concepts and processes being described. It is perhaps for this reason that ORI's definition of plagiarism (Office of Research Integrity, 1994) provides the following caveat:

“ORI generally does not pursue the limited use of identical or nearly-identical phrases which describe a commonly-used methodology or previous research because ORI does not consider such use as substantially misleading to the reader or of great significance.”

All of the above considerations serve to illustrate the reason why an operational definition of proper paraphrasing/plagiarism (i.e., how many consecutive words taken from the original constitutes plagiarism) is impractical, not to mention the fact that there are certain stock phrases, perhaps even entire sentences that occur with some frequency in unrelated journal articles (e.g., “the results obtained do not support the hypothesis”). Nevertheless, and in spite of the above clarification provided by ORI, a responsible writer has an ethical responsibility to readers and to the author/s from whom s/he is borrowing, to always respect and acknowledge their intellectual content.

Plagiarism and common knowledge

As noted above, we always must give proper credit to those whose ideas and facts we are using. One general exception to this principle occurs when the ideas we are discussing represent “common knowledge.” If the specific facts and figures we are discussing are assumed to be known by the readership, then one need not provide a citation. For example, suppose you are an American student writing a paper on the history of the United States for a college course. In your paper, you mention the fact that George Washington was the first president of the United States and that the Declaration of Independence was signed in the year 1776. Must you provide a citation for that pair of facts? Most likely not, as these are facts commonly known by average American high school and college students. The general expectation is that “everybody knows that”. However, suppose that in the same paper you must identify the 23rd president, his running mate, and the main platform under which they were running for office, plus the year they both assumed power. Should such material be considered common knowledge? The answer is probably no, for it is doubtful that the average American student would readily know those facts without needing to consult an authoritative source (I had to look up the answers).

But, the question of what constitutes common knowledge is a little more complicated. Let's take another example. Imagine that we are writing a paper and we need to discuss the movement of sodium and potassium ions across a cell's membrane as described by the Martini and Bartholomew paragraph above. Surely, those ideas are not common knowledge amongst college students and if they were expected to use those concepts in a paper they would be expected to provide a citation. However, let's suppose that the individual writing the paper was a seasoned neuroscientist and that she intended to submit her paper for publication to a professional journal. Would the author need to provide a citation for that material? Not necessarily. Although for the non-scientist the description of the concentration gradients of sodium and potassium ions inside neurons may look sufficiently complex and unfamiliar, the material is considered common

knowledge amongst neuroscientists. It would, indeed, be shocking to find a neuroscientist or biomedical researcher who was not familiar with those fundamental concepts.

In sum, the question of whether the information we write about constitutes common knowledge is not easily answerable and depends on several factors, such as who the author is, who the readers are, and the expectations of each of these groups. Given these considerations, we recommend that authors abide by the following guideline:

Guideline 8: When in doubt as to whether a concept or fact is common knowledge, provide a citation.

Plagiarism and authorship disputes

Consider the following scenario. Two researchers who have collaborated on various projects in the past have jointly published a number of papers. Three quarters into the writing of the manuscript from their most recent joint project, the researchers experience a profound difference of opinion regarding the direction of the current project and the incident leads to the eventual break-up of their research collaboration. Soon after, one of the researchers moves to another institution in another country and begins to pursue a different line of research. A year later, the remaining researcher decides to finish writing the remaining quarter of the manuscript and submits it for publication with his name as sole author. By appropriating the joint manuscript and submitting it under his name, has this other researcher committed plagiarism?

Before attempting to answer this question, let's consider another scenario. A graduate student working under her mentor's supervision makes an interesting discovery as part of her doctoral thesis work. Before she is ready to publish her thesis, however, her mentor feels that the discovery merits immediate publication and decides to report her data, along with other data he had collected from other graduate fellows working in his lab, in a journal article. The mentor does not list the graduate student's name as a co-author nor is there a byline in the article indicating the extent of her contribution under the pretext that the student's contribution in and of itself was not sufficient to merit authorship.

In the above scenarios, it should be clear that the intellectual property of one individual has been misappropriated. Denial of earned authorship represents an ethical breach that many individuals and institutional policies, including that of the National Science Foundation, would consider an instance of plagiarism. However, not everyone agrees that these types of cases are plagiarism and, therefore, research misconduct. For example, ORI classifies these problems as **authorship disputes** and not within their definition of research misconduct. The involved parties can avoid these and other troublesome situations, such as disputes regarding the order of authorship of a paper, by discussing and agreeing on a plan **before** work on a project commences (see section on authorship).

An interesting fact of our work as scientists is that our research and writing may be simultaneously governed by more than one set of policies. For example, and especially in North America, the institution at which we work will likely have a research misconduct policy, the organization that funds our work may have its own misconduct policy, and so might the professional organizations to which we belong. In most instances, those policies will be similar across the various domains of coverage (e.g., plagiarism, authorship, data

sharing). However, there may also be subtle differences in how specific situations might be interpreted. For example, authorship resulting from students' doctoral work can differ across disciplines (e.g., psychology vs. biomedicine) and also across countries within a single discipline (see Australian Psychological Association). Similarly, authorship disputes may be classified as instances of plagiarism by one misconduct policy, but not by another policy. As result of these differences a problematic research behavior, such as certain instances of plagiarism, may be viewed as misconduct by an institution, but not by the funding agency.

As this document illustrates, plagiarism can manifest itself in a variety of situations and these can range in degree of seriousness. Although coverage has been provided for the most common forms, there are surely many other scenarios that represent instances of this type of misconduct. In the next section our attention is turned to the problem of self-plagiarism.

SELF-PLAGIARISM

(This section of the module has been substantially modified from its earlier version)

Given that plagiarism is often conceptualized as theft, the notion of self-plagiarism does not seem to make much sense. After all, is it possible to steal from oneself? In fact, Hexam (1999) has pointed out that it is, indeed, possible to steal from oneself as when one engages in embezzlement or insurance fraud. However, when applied to research and scholarship, self-plagiarism refers to authors who reuse their own previously disseminated content and pass it off as a "new" product without letting the reader know that this material has appeared previously. According to Hexam, "... the essence of self-plagiarism is [that] the author attempts to deceive the reader." Let us remember that the concept of ethical writing, upon which the present instructional resource is grounded on, entails an implicit contract between reader and writer whereby the reader assumes, unless otherwise noted, that the material was written by the individual/s listed as authors, and that it is new and is accurate to the best of the author's abilities. As such, self-plagiarism misleads the reader about the novelty of the material. In this section we review some of the most common instances of self-plagiarism and provide guidelines to avoid these pitfalls.

Self-plagiarism is often described in the context of several distinct practices in which some or all elements of a previous publication (e.g., text, data, and images) are reused in a new publication with ambiguous acknowledgement or no acknowledgement at all as to their prior dissemination. Perhaps the most blatant of these practices occurs when a previously published paper is later published again with very little or no modification. However, less blatant forms of duplication exist and these are sometimes classified with various labels, such as redundant, dual or overlapping publication. In examining these types of malpractices, the reader should keep in mind that the various forms of self-plagiarism are best thought as laying in a continuum in which the extent and the type of duplication can vary from substantial to minor, as does their potentially serious effects on the integrity of the scientific record.

A common practice for authors of trade books is to send their manuscript to several publishers. However, for authors of scientific or scholarly papers the acceptable practice is to submit their paper for publication to a single journal. Of course, an author may submit the same paper or a revised version of it to another journal, but only if it is determined that the journal to which it was first submitted has declined to publish it. Only under specific circumstances (see below) would it be acceptable for a paper published in one journal to appear in another journal.

In spite of these universally accepted practices, redundant publication¹ continues to be a problem in the biomedical sciences. For example, in one editorial, Schein (2001) describes the results of a study he and a colleague carried out which found that 92 out of 660 studies taken from 3 major surgical journals were actual cases of redundant publication. The rate of duplication in the rest of the biomedical literature has been estimated to be between 10% to 20% (Jefferson, 1998), though one review of the literature suggests the more conservative figure of approximately 10% (Steneck, 2000). However, the true rate may depend on the discipline and even the journal and more recent studies in individual biomedical journals do show rates ranging from as low as just over 1% in one journal to as high as 28% in another (see Kim, Bae, Hahm, & Cho, 2014). The current situation has become serious enough that biomedical journal editors consider redundancy and duplication one of the top areas of concern (Wager, Fiack, Graf, Robinson, & Rowlands, 2009) and it is the second highest cause for articles to be retracted from the literature between the years 2007 and 2011 (Fang, Steen, & Casadevall, 2012). Many biomedical journals now have explicit policies clarifying their opposition to multiple submissions of the same paper. Some journals even request that authors who submit a manuscript for publication must also submit previously published papers or those that are currently under review that are related to the topic of the manuscript under consideration. This requirement has been implemented to allow editors to determine whether the extent of overlap between such papers warrants the publication of yet another similar paper. If, in the opinion of the editor, the extent of overlap were substantial, the paper would likely not be published.

Duplicate (dual) publication

A sizable portion of scientific and scholarly research is carried out by individuals working in academic or research institutions where advancement structures continue to rely on the presentation and subsequent publication of research in peer-reviewed journals. Because the number and the quality of publications continue to be the most important criteria for gaining tenure and/or promotion, the more publications authored by a researcher, the better his/her chances of earning a promotion or tenure. As can be expected, and in the context of decreasing or, at best, stagnant funding for research, the current reward system produces a tremendous amount of pressure for scientists to generate as many publications as possible. Unfortunately, some of the most serious negative consequences of the present system, aside from fabrication, falsification and outright plagiarism, are the problems of duplicate publication and of other forms of redundancy. In the sciences, duplicate publication generally refers to the practice of submitting a paper with identical or near identical content to more than one journal, without alerting the editors or readers to the existence of its earlier published version. The new publication may be exactly the same (e.g., identical title, content, and author list) or differ only slightly from the original by, for example, changes to the title (see, for example, Attoui, Kherici, and Kherici-Bousnoubra, 2014), abstract, and/or order of the authors. Papers representing instances of duplicate publication almost always contain identical or nearly identical text and/or data relative to the earlier published version. More problematic instances of duplicate publication occur when various components of a paper change (e.g., title, authorship), but the underlying data remain the same, making duplication more difficult to uncover.

Duplicate publication in the academic context: ‘Double-dipping’. Duplicate publication has a direct counterpart in the area of academic dishonesty. In the US it is commonly referred to as ‘double dipping’. It occurs when a student submits a whole paper, or a substantial portion of a paper that had been previously submitted and graded in another course to fulfill a

requirement of a new course. Many college undergraduates and even some instructors are not aware that this type of practice is a serious academic offense (Hallupa & Bolliger, 2013). Of course, as is the case with duplicate publication, submitting the same paper or a large portion of a paper, to two different courses is entirely acceptable if the student sought permission from the instructors of both courses and they both agreed to the arrangement. However, some institutions may have specific policies prohibiting this practice under most circumstances.

Instances in which dual publication may be acceptable. Some authors who submit the same article to more than one journal rationalize their behavior by explaining that each journal has its own independent readership and that their duplicate paper would be of interest to each set of readers who would probably not otherwise be aware of the other publication. Indeed, there may be circumstances that justify the dual publication of a paper. For example, duplicate publication may be acceptable when an article published in one language is translated into a different language and published in a different journal. However, and consistent with existing guidelines, in all cases where the same paper is published in different journals, whether it is a translated version or the same identical paper, editors of both journals would have to agree to this arrangement and the new version must clearly indicate that it is a duplicate of an existing version. In addition other important conditions must be met and the interested reader should consult sources, such as ICMJE (2014) or Iverson et al. (2007). Similarly, any documentation in which authors list their publications as evidence of their research productivity (e.g., personal vita, ResearchGate), authors would be expected to identify both papers as being identical.

Redundancy, publication overlap and other forms of duplication

Although the prevalence of blatant duplicate publications varies across disciplines, its overall prevalence is relatively low (see Larivière & Gingras, 2010) and their impact on the integrity of science is likely minor, particularly in instances when the published papers are truly identical (i.e., same title, abstract, author list). However, other forms of duplication exist and these are often classified with terms such as redundant publication or overlapping publication (see p 148 of Iverson, et al., 2007 for additional descriptive terms). As indicated earlier, these types of self-plagiarism are more prevalent and likely more detrimental to science because they involve the dissemination of earlier published data that are presented as new data, thereby skewing the scientific record. Bruton (2014) and others (e.g., von Elm, Poggia, Walder & Tramer, 2004) have discussed various other types of duplication. Below are some of the most common forms.

Data aggregation/augmentation. In this type of duplication, data that have already been published are published again with some additional new data (see Smolčić & Bilić-Zulle, 2013). The resulting representation of the aggregated data is likely to be conceptually consistent with the original data set, but it will have different numerical outcomes (i.e., means and standard deviations), figures, and graphs (see Bonnell, Hafner, Hersam, Kotov, Buriak, Hammond, Javey, Nordlander, Parak, Schaak, Wee, Weiss, Rogach, Stevens & Willson, 2012 for an example). This type of publication is highly problematic when the author presents the data in a way that misleads the reader into believing that the entire data set is independently derived from the data that had been originally published. That is, the reader is never informed that a portion of the data being described had already been published or perhaps the presentation is ambiguous enough for the reader to be unable to discern the true nature of the data.

Data disaggregation. As the label suggests, data disaggregation occurs when data from a previously published study are published again minus some data points and with no

indication or, at best, ambiguous indication as to their relationship to the originally published paper. The new study may consist of the original data set minus a few data points now considered outliers, or perhaps data points at both ends of their range that happen to lie outside a newly established criterion for inclusion in the new analyses, or perhaps some other procedure that results in the exclusion of some of the data points appearing in the original study. As with data augmentation, the new publication with the disaggregated data will contain different numerical outcomes (i.e., means and standard deviations), figures, and graphs, however, the underlying data are largely the same as the previously published data, but are presented in a way that misleads the reader into interpreting the ‘new’ data as having been independently collected.

Data segmentation. Also known as Salami Publication or Least Publishable Unit, data segmentation is a practice that is often subsumed under the heading of self-plagiarism, but which, technically is not necessarily a form of duplication or of redundancy as Bruton, 2014 has correctly pointed out. It is usually mentioned in the context of self-plagiarism because the practice often does include a substantial amount of text overlap and possibly some data as well, with earlier publications by the same author/s. Consider the examples provided by Kassirer and Angell (1995), former editors of *The New England Journal of Medicine*:

“Several months ago, for example, we received a manuscript describing a controlled intervention in a birthing center. The authors sent the results on the mothers to us, and the results on the infants to another journal. The two outcomes would have more appropriately been reported together. We also received a manuscript on a molecular marker as a prognostic tool for a type of cancer; another journal was sent the results of a second marker from the same pathological specimens. Combining the two sets of data clearly would have added meaning to the findings.” (p. 450).

In some cases, the segmenting of a large study into two or more publications may, in fact, be the most meaningful approach to reporting the results of that research. Longitudinal studies are an example of this type of situation. However, dividing a study into smaller segments must always be done with full transparency, showing exactly how the data being reported in the later publication are related to the earlier publication. An often stated rationale used by some authors for not disclosing the relationship between related publications or for other forms of covert overlap between publications is that both reports are prepared and submitted simultaneously to different journals (see, for example, Katsnelson, 2015). However, this should not be considered an acceptable excuse for not disclosing any overlap between studies, especially to the editors of the journals. Authors should describe how the study data being described are related to a larger project. They can always provide a footnote, author note or some other indication that manuscripts describing the other portions of the data set are in preparation or under consideration, etc., which ever the case may be. The important point is that readers need to be made aware that the data being reported were collected in the context of a larger study. As with other forms of redundancy and actual duplication, salami slicing can lead to a distortion of the literature by leading unsuspecting readers to believe that data presented in each salami slice (i.e., journal article) are independently derived from a different data collection effort or subject sample.

Guideline 9: Authors of complex studies should heed the advice previously put forth by Angell & Relman (1989). If the results of a single complex study are best presented as a ‘cohesive’ single whole, they should not be partitioned into individual papers.

Furthermore, if there is any doubt as to whether a paper submitted for publication represents fragmented data, authors should enclose other papers (published or unpublished) that might be part of the paper under consideration (Kassirer & Angell, 1995).

Other forms of redundancy with or without text or data duplication.

Reanalysis of the same data. There may be occasions in which previously published data can be analyzed using a novel technique not available at the time of publication. Or perhaps the authors thought of a new way to analyze the data using an existing technique. Both of these scenarios and still others perhaps may warrant a re-examination of the data. However, it should be obvious that authors need to be fully transparent with their readers by indicating the fact that earlier analyses of the data have already been published.

Same data; different conclusions. von Elm, et al, (2004) describe have described various other forms of redundancy. For example, a related practice occurs when authors publish the same data, with a somewhat different textual slant within the body of the paper and, again, with ambiguous or non existent acknowledgment of the earlier publication. Such redundant papers may contain a slightly different interpretation of the data or the introduction to the paper may be described in a somewhat different theoretical, empirical, or perhaps subject sample context. Sometimes, additional data or somewhat different analyses of the same, previously published data are reported in the redundant paper.

Why duplication and other forms of redundancy must be avoided

The fact of the matter is that all the above malpractices in which readers are fully informed or are outright misled about the provenance of the data are frowned upon by most scientific journals (see Kassirer & Angell, 1995) and most of the major scientific writing guides caution against them (e.g., Iverson, et al., 2007).

The apparent glut of quality scientific journals notwithstanding, a paper that appears in two different journals unbeknownst to readers and editors may have robbed other authors of the opportunity to publish their worthwhile original work. In addition, while a paper can always benefit from additional critical peer review, journal referees often must volunteer their valuable time to review others' work in the service of science and scholarship. Refereeing what turns out to be a duplicate or redundant publication places undue time and limited resource constraints on the editorial and peer review system. More importantly and particularly in the sciences, is the fact that covert dual/redundant publications likely result in readers being misled as to the true nature of a given phenomenon or process. For example, an author who wishes to study the significance of an experimental effect or phenomenon using sophisticated statistical techniques, such as meta-analysis, will likely overestimate or perhaps underestimate the magnitude or reliability of an effect if the same experiment were to be counted twice. Consider the following anecdote reported by Wheeler (1989):

“In one such instance, a description of a serious adverse pulmonary effect associated with a new drug used to treat cardiovascular patients was published twice, five months apart in different journals. Although the authors were different, they wrote from the same medical school about patients that appear identical. Any researcher counting the incidence of complications associated with this drug from the published literature could easily be misled into concluding that the incidence is

higher than it really is.” (p.1).

Redundant publication practices can distort the conclusions of literature reviews if the various segments of a salami publication or the augmented data that represent data from the same subject sample, are included in a meta analysis under the assumption that all of the data are derived from independent samples (Tramer, Reynolds, Moore, and McQuay, 1997) and evidence indicates that some meta-analytic studies have been contaminated by duplicate data (Choi, Song, Ock, Kim, Lee, Chang, & Kim, 2014). For this reason, all forms of covert data reuse can have serious negative consequences for the integrity of the scientific database. In certain key areas of biomedical and social science research the consequences of duplicated data can result in wrong health policy recommendations that could place the public at risk.

Guideline 10: Authors who submit a manuscript for publication containing previously disseminated data, reviews, conclusions, etc., must clearly indicate to the editors and readers the nature of the previous dissemination. The provenance of data must never be in doubt.

Text recycling from an author’s previously disseminated work

Authors who engage in programmatic research often end up writing a series of related papers each of which describes individual empirical investigations that use similar or nearly identical methodologies. The background literature pertinent to one paper may be largely applicable to the other papers on the same subject. Thus, it is possible for some authors to have to generate two or more papers describing truly independent studies that contain identical or very similar methodologies, background literature, and discussion elements. The pressure to publish felt by most researchers, together with the ease with which entire blocks of text can be transferred from one document to another one, present unique challenges to those authors who recognize that substantial text reuse is highly problematic. The allure to reuse previously disseminated, well-written text can be particularly difficult to resist for authors who are not dominant in English, especially for those who have traditionally relied on the practice of reusing smaller snippets of text out of pure necessity (see Flowerdew and Li, 2007). Regrettably, instances do occur in the scientific literature of published empirical investigations that are subsequently retracted for self-plagiarism of text because much of the paper is taken verbatim from a previously published one by the same author (see Marcus, 2010, for an example).

Just as there is no consensus or official guidance on the extent to which text must be modified to qualify as an appropriate paraphrase, there is also no consensus as to how much text an author may recycle from his/her previous writings. It should be evident, however, that from the perspective of the reader-writer contract, the recycling of one’s own previously disseminated content is not consistent with the principles of ethical writing. Thus, an overview of the more common situations in which recycling is likely to occur is worth examining.

Situations in which recycling previously disseminated textual content may be acceptable.

As with redundant publication, certain situations exist under which text recycling may be deemed acceptable even if, on the surface, it would seemingly violate the spirit of the reader-writer contract. For example, before engaging in the actual research project, authors will need to prepare protocols (e.g., IRB protocol, trial registration applications), that describe in detail the background of the research, purpose, scope, expected results, etc. The convenience of recycling from these documents (e.g., Institutional Review Board (IRB) applications, Animal Care and Use Committee applications, internal grant applications) or other forms of unpublished ‘internal’ documents is obvious. Given the limited dissemination of these documents, the fact that they are not copyrighted or published, it should be acceptable to reuse their content in subsequent presentations/publications targeted for wider dissemination (e.g., conference presentations, published papers). Of course, there may be exceptions, such as when the original documents are written for a private entity which may have claims of ownership of any material generated by the author. In these cases permission to subsequently publish portions of such material must be obtained. Another problematic situation occurs when the text in question was the result of a collaborative effort between multiple individuals. Although reuse of certain methodological material (see section below on boilerplate language) and related content may be acceptable across various subsequent published papers, reuse of other content from these documents in more than one paper is less clear and possibly not consistent with the reader-writer contract. Be that as it may, any reuse of limited-circulation internal-type documents (e.g., IRB protocols) should, when applicable, have the approval of the institution under which they were generated and also of any co-authors of the original documents.

Recycling boilerplate language. Boilerplate language is most often associated with the legal profession and it refers to portions of text that are routinely reused in legal documents that convey a specific, standard meaning. In the sciences, the term “boilerplate language” has been used in recent decades to describe analogous standard language usually, but not always, of a technical nature. For example, language from the operating instructions of scientific equipment may be adopted by authors in their description of the technical aspects of an instrument and/or procedures associated with the proper use of that instrument. Similarly, laboratories working in a difficult research problem may develop a set of precise descriptions of highly complex processes and/or procedures that may be equally applicable, perhaps with minor modifications, across many different experiments. Thus, in certain journal articles produced by the same or even different groups of author-investigators, it is possible to find portions of identical so-called boilerplate text in sections that describe these same complex processes or procedures. However, and especially in the absence of any other duplication, such reused text should be deemed acceptable and be interpreted as standard, boilerplate, language. Other instances of boilerplate language that describe the nature of an institution’s research facilities, laboratory, or computing equipment may be offered by, for example, an institutions’ grant offices about for purposes of assisting their staff in preparing their grant applications.

Recycling methods and other sections from our previously published papers. In writing methodology sections of empirical papers, one of the goals of authors is to provide all the necessary details so that an independent researcher can replicate the study. These sections are often highly technical and, consequently, can be very laborious to produce given the need for exceptional clarity and precision. Given these considerations, the question arises as to the acceptability of recycling entire methods sections or large portions of these sections with only the necessary modifications to reflect the new conditions being studied (except for an attempt at replication, it is probably rare for the exact same method to be repeated from one related experiment to the next). A similar situation occurs when we

summarize others' work in literature reviews, arguably a less complex writing task relative to writing a methods section. Of course, if an author were to adhere to formal rules of scholarship and to the implicit contract between reader and writer embodied in the concept of ethical writing, s/he would need to put any verbatim text from the method section in quotation marks and appropriately paraphrase any other recycled text that is not placed in quotations. But, as stated earlier, the use of quoted material is seldom practiced in IMRD papers in the sciences.

Unfortunately, as shown by a recent review of journal editorials on the subject of plagiarism and self-plagiarism, there seems to be no clear consensus on this matter (Roig, 2014). For example, some journals may allow the reuse of text from literature reviews and methods sections (e.g., Kohler, 2012). Others will allow reuse of methods sections only (Shafer, 2011), while others Swaan (2010) do not permit any text reuse. One potential danger in copy pasting earlier used methods sections lies in the possibility of including material that is not relevant. For example, in a section titled "Avoidable errors in manuscripts" Biros (2000), a former editor-in-chief of *Academic Emergency Medicine* writes:

"Methods are reported that were not actually used. [This] most frequently occurs when an author has published similar methods previously and has devised a template for the methods which is used from paper to paper. Reproducing the template exactly is self-plagiarism and can be misleading if the template is not updated to reflect the current research project." (p. 3).

In addition to self-plagiarism, the reuse of large portions of text from previously published papers may be problematic for other reasons. One reason for avoiding copy-pasting content between papers concerns the possibility of introducing material that is not relevant to the current manuscript. For example, a study by Hammond, Helbig, Benson and Brahtwaite-Sketoe (2003) revealed that copy-pasting in the context of medical records resulted in errors, some of which were deemed potentially unsafe for patients. Surely, an analogous situation can occur when authors copy-paste from their previously published papers (or from others' papers!). Evidence suggests that this malpractice continues to be a problem (O'Reilly, 2013). The other reason why reusing text from one publication to another may be problematic is best illustrated in the following scenario: an author takes a substantial amount of text from one of her papers that had been published in a journal owned by one publisher and recycles that text in a paper that will now be published by a journal owned by a different publisher. In this situation, the author may be violating copyright rules. Thus, Biros (2000) also cautions that:

"Many authors do not understand the implications of signing the copyright release form. In essence, this transfers ownership of the paper and all of its contents from the author to the publisher. Subsequent papers written by the same author therefore must be careful not to reproduce in any way material that has previously been published, even if it is written by them. Such copying constitutes self-plagiarism." (p. 4).

Again, the question of reusing segments from previously published work becomes a bit more complicated when the original work was multi-authored and there is no agreement as to who might reuse such work if reuse is permitted. In these types of situations the potential for an accusation of plagiarism by a co-author who does not approve of the reuse could easily develop.

On the other hand, there is a very good argument to allow liberal reuse of previously published methodologies. As discussed earlier, methods sections often include very intricately complex descriptions of procedures and processes that are laden with unique terminology and phraseology for which there are no acceptable equivalents (e.g., *Mammalian histone lysine methyltransferase, suppressor of variegation 39H1 (SUV39H1)*). Even when major textual modifications to these sections are possible, a change in the language can run the risk of slightly altering the intended meaning of what is being described and such an outcome is a highly undesirable in the sciences. Thus authors should be allowed some latitude in terms of the extent to which they should modify portions of text when paraphrasing material from methodology sections that is highly technical in nature, even if the material is derived from other sources. In this context, it is worth keeping in mind the following segment from ORI's definition of plagiarism (Office of Research Integrity, 1994):

“ORI generally does not pursue the limited use of identical or nearly-identical phrases which describe a commonly-used methodology or previous research because ORI does not consider such use as substantially misleading to the reader or of great significance”.

Guideline 11: While there are some situations where text recycling is an acceptable practice, it may not be so in other situations. Authors are urged to adhere to the spirit of ethical writing and avoid reusing their own previously published text, unless it is done in a manner that alerts readers about the reuse or one that is consistent with standard scholarly conventions (e.g., by using of quotations and proper paraphrasing).

There are benefits to the limited reuse of textual material from methods sections. However, substantial text recycling of most other parts of a typical journal article and particularly when carried out by native writers of English, suggest a certain degree of scholarly laziness. At worst, these practices, particularly when they involve the presentation of previously published data that is presented as new data, can result in serious consequences to the scholarly and scientific literature, to public health, and even to the perpetrator if the trespass is serious enough to warrant a charge of research misconduct. Authors are well advised to carefully review the editorial guidelines of journals to which they submit their manuscripts, as well as their disciplines' codes of ethics. More importantly, scientists and scholars need to be reminded that they are always held to the highest standards of ethical conduct and need to be 100% transparent with their readers.

Self-plagiarism within and across various other dissemination domains

The material reviewed above raises some questions about the appropriateness of content reuse in other domains of research and scholarship. The discussion below addresses some of the more common situations where reuse should be carefully reconsidered.

From conference to conference. In most disciplines, presenting one's work at conferences has been a long-standing tradition in scholarly and scientific work. Audiences are exposed to the latest ideas/data on a given topic and, in turn, authors gain valuable feedback on their

work, which allows them to further refine their ideas, thereby maximizing their chances of getting their work published in a peer-reviewed journal. In some disciplines, such as political science, the presentation of the same paper in multiple conferences has become a more common practice (Dometrius, 2008) and this development has been a source of concern for some in that discipline about possible skewed perceptions of authors' productivity for some in that discipline (e.g., Sigelman, 2008), though not for others (e.g., Cooper & Jacoby, 2008; Schneider & Jacoby, 2008). No doubt similar questions have been raised by members of other scientific disciplines. But, as with matters related to self-plagiarism where there can be wide differences of opinion, it is likely that academics are equally split with respect to the appropriateness of recycling conference papers.

A number of factors ought to be considered when deciding to recycle a conference paper and the type of presentation made (e.g., invited address, symposium, panel discussion, traditional paper) and the context in which the presentation is made may determine the acceptability of recycling a paper. For example, in any discipline renowned subject-matter experts are routinely invited by universities, professional organizations (i.e., conferences) or by other entities to present their research. In these situations there should be no particular assumption of novelty on the part of the audience about the content of the presentation. Nonetheless, and consistent with the theme of this module, it would be highly recommended for presenters to indicate to their audience at the beginning of each event whether the presentation is new or a revised version of an earlier presentation.

For traditional conference submissions, an important consideration is whether the organization sponsoring the meeting only accepts original presentations. Determining whether a presentation is original is not always easy because of the possibility that an original presentation may also contain previously disseminated data, text and/or figures. As might be done with papers submitted to journals, authors of papers that may contain some previously presented content should inquire with the conference organizers whether their presentation is sufficiently original to warrant submission. For example, when a previously presented paper is disseminated at a different conference and retains the same title and authorship, audience members who happened to have heard the first version are more likely to recognize that the same material, with perhaps some revisions, is being presented again and can decide whether to attend or not. Certainly, in situations where conference activity is taken into account as a measure of research productivity, members of promotion and/or tenure committees should be readily able to discern that individual's true level of productivity when the same presentation is listed separately, but maintains the same identical title, authorship, and text. On the other hand, questions can arise when authors change the title and/or authorship of a presentation without making additional substantive changes to the actual paper. Although audience members who heard the first presentation in a previous conference might recognize the author, the presence of a different title may lead them to mistakenly believe that the new presentation is substantially different from the earlier one when, in fact, it is not. The same will apply to members of promotion and tenure review committees who review the author's curriculum vitae. Because members of such committees might not have the time to carefully examine each presentation listed, a mere change in titles may mislead them into believing that the various presentations with different titles are independent products, suggesting that the author is much more productive than s/he truly is. For these reasons, it is important for authors to alert audience members and those reviewing the author's curriculum vitae, as to whether each presentation may be a revised version of an earlier presentation, a brand new presentation or a combination of the two, especially if there are changes to the title, abstract or authorship. Again, in principle, these issues are applicable to all academic researchers, for not only must data always be clearly conveyed as either new or previously disseminated, but data collection in some disciplines can be an arduous and

time-consuming task that can take many weeks or months. Thus, if members of promotion and tenure committees from countries where conference presentations are used as evidence of research productivity interpret a recycled paper as presenting new data, whether the paper is a conference presentation or a journal article, such a misinterpretation will give a mistaken impression that the author is much more productive than s/he truly is.

A related issue concerns the subsequent publication as conference proceedings of conference presentations. Given the emphasis on characteristics, such as clarity, thoroughness, completeness, etc., in scientific writing, there should never be any confusion as to the provenance of the data so that audience members or readers of proceedings can properly assimilate the results of that research. Failure to interpret new data as previously disseminated could conceivably lead to a misrepresentation of the exact scientific status of an effect/phenomenon. Therefore, as with instances of recycled data in published papers, presenting previously disseminated data in conferences as new data, may, under certain conditions, be analogous to fabricating data, a serious form of research misconduct.

GUIDELINE 12: In the domain of conferences and similar audio-visual presentations of their work, authors should practice the same principles of transparency with their audiences.

From conference to journal article/book. After delivering a conference paper and perhaps based on the audience's feedback, authors will often prepare a formal paper to be submitted for publication to a journal or perhaps an edited book. This practice is a long-standing tradition and has generally been always acceptable. However, recent trends in the publication of conference proceedings call for caution in subsequent submissions to journals and/or books. For example, in cases where abridged versions of the paper or even the preliminary papers themselves are copyrighted and subsequently published as proceedings by the sponsoring organization, authors should inquire as to whether these organizations permit republication of their materials. Likewise, and in the case in which published proceedings exist and subsequent publication of the paper is allowed by the publisher of the proceedings, authors submitting a paper for publication must first alert the editor about the existence of the earlier published version of the paper. In addition, readers must also be informed about the prior version and such communication can be easily accomplished through an author note or analogous mechanism. Keep in mind that different journals have different criteria for publishing earlier presented work that later appears in proceedings in either electronic or print form. Some editors will consider the expanded publication of an earlier published proceedings abridged paper or long abstract as a case of redundancy. In some such cases, the expanded published version of the paper may be retracted as occurred in a recent case described by Vasconcelos and Roig (2015).

From journal article to journal article or from journal article to book. Instances have occurred in which authors of, say, review papers, whether these reviews appear in a journal article or in a book, misappropriate significant portions of material without enclosing such material in quotation marks and providing a citation, or without giving any indication as to the material's true origin. This practice, of course, represents an instance of plagiarism. However, what if the reused material is derived from the author/s' previously published articles or books? Such practices are ethically inappropriate even if the author him/herself owns the copyright to the previously published material. Again, the important consideration here is the failure to inform the author that the material has appeared elsewhere. Of course, one should be free to reuse with proper attribution and quotation one's earlier work. But, even here there may be proprietary issues if the author does not hold the copyright to his/her

earlier work. Some publishers have strict guidelines as to how much material one may quote from with attribution. For example, consider the American Psychological Association's position on this matter (*Publication Manual of the American Psychological Association*, 2010, p. 173):

APA policy permits author to use, with some exceptions, a maximum of three figures or tables from a journal article or book chapter, single text extracts of fewer than 400 words, or a series of text extracts that total fewer than 800 words without requesting formal permission from APA. It is important to check with the publisher or copyright owner regarding specific requirements for permission to quote from or adapt copyrighted material.

From dissertation to journal article/book and vice versa. It is common for authors of theses and dissertations to subsequently publish their thesis or dissertation work in journal articles or books. This practice has been traditionally acceptable even when the thesis or dissertation has already been submitted to an electronic repository such as ProQuest's UMI® (Ramirez, Dalton, McMillan, Read, and Seamans, 2013). Nevertheless it is important for authors to check with the publisher to whom they intend to submit their work. If acceptable, authors must nevertheless include a note in the journal article or book indicating that the work is based on the author's thesis or dissertation work. In cases where the dissertation work leads to two or more articles, authors must ensure that each article also mentions that the work described in the paper is part of a larger work published elsewhere. Authors must also have a legitimate rationale for publishing the papers separately, lest there be a charge of salami publishing. A related question is whether authors may reuse smaller portions of their thesis or dissertation work in an article or book. Again, this is perfectly acceptable as long as the author provides a full citation and uses quotation marks. Should there be an objection to the use of quotation marks an author can always alert the reader by prefacing the material with a statement such as, "As I described in my doctoral thesis, which I reproduce here verbatim....".

In some academic programs, the tradition has been for the doctoral student to first publish an article or two and then to reformat the published work and submit it as a dissertation. In some cases, research that has already been published outside of the immediate academic department where work for the degree is being carried out may be an acceptable fulfillment of the requirements of the dissertation. Such cases may be somewhat complicated if the outside work was carried out in collaboration with others, which may make it difficult to estimate the exact contribution of the student working for the degree. Obviously, the doctoral student must disclose in full the extent of his/her contribution to the published work.

Grant proposals

The ability to obtain external funding to carry out one's research is increasingly a requirement for hiring, promotion, and tenure in some disciplines. For many scholars and scientists already working within a "publish-or-perish" climate, writing grant proposals is an additional challenge to survival within the profession. Given these pressures, many authors elect to use shortcuts by reusing previously disseminated content in their funding applications in an effort to save time and effort. For example, an internal study of 8,000 funded grant applications to the US National Science Foundation (NSF), uncovered plagiarism in about 1% to 1.5% of those applications (Mervis, 2013). More recently, Garner, McIver, and Waitzkin, (2013) analyzed over 800,000 grant application summaries to 5 major funding agencies and, using a conservative measure of analysis, uncovered a total of 167 duplicates.

With a more liberal approach, these authors reported that as many as 12,441 pairs may have included some degree of duplication. Needless to say, recycling content from others' work without permission and/or acknowledgement, including funded or unfunded grant proposals constitutes plagiarism, a type of research misconduct. But, what about recycling content in grant applications from our own previously disseminated work, including previously submitted funding requests?

Recycling from grant proposal to grant proposal. It is not uncommon for researchers working on a complex problem to prepare separate funding proposals on various separate but related components of the phenomena being studied. Such proposals will likely have identical or nearly identical common literature review, methodology and materials, and perhaps still other elements of a previously submitted application. In addition, funding applications are also increasingly multi-authored. In these and other situations, questions may arise as to whether an author can simply reuse portions of text from one proposal in which s/he is principal investigator or co-investigator to another proposal. From the perspective of the reader-writer contract, such reuse is probably acceptable, given the nature of the written product: the application itself is not published and the scope of dissemination of its contents is limited. However, authors must remember that some funding agencies may have specific parameters for the reuse of content from earlier submitted grant proposals to the same agency, whether these earlier proposals have been funded or not. (Obviously, one may reuse the entire contents of an unfunded grant application in a new grant application that is targeted to another funding agency). For example, in the United States, a grant that is not funded after the first submission to the National Institutes of Health (NIH) may be resubmitted with revisions. The reuse of content from the older application to the newer application does not come into question as the situation is analogous to revising a textbook. However, if the second time it is submitted the proposal is not funded, it may not be resubmitted again to that agency. Thus, the question arises as to whether an applicant may reuse substantial portions of the unfunded proposal for a "new" proposal to the same agency. Of course, a grant applicant may submit, as new, a proposal related to the earlier problem for which funding had been sought and denied, but this must be done such that the project investigates a substantially new, albeit, related problem or perhaps studies the old problem using a different methodology. With this in mind, there would be no harm in reusing portions of, say, literature reviews and perhaps even some methodology. However, the applicant must ensure that the focus of the investigation is different from the previously unfunded submission. Alternatively, the applicant may submit a proposal about a related idea and may consider reusing relevant material from the older unfunded proposal or from another related proposal that had been previously funded. In such cases, the applicant should check with the relevant agency for their guidelines regarding reuse and the criteria for determining whether the new submission to that agency constitutes a new proposal or a revised version of an earlier one. Given the current science funding climate in the US and elsewhere, the question of what constitutes a new proposal vs. a revised one is not an easy one to answer. For example, the NIH has some very specific requirements about these matters with which applicants must become familiar (see http://grants.nih.gov/grants/policy/resubmission_q&a.htm). Nonetheless, if material is being reused from a previous application, whether funded or unfunded, nothing prevents the applicant from adhering to the spirit of the reader-writer contract and alerting the reader about the extent of the reuse. This is especially relevant given the possibility that some of the referees reviewing the new grant proposal may have reviewed the old proposal. In that respect, and at a time of increasing emphasis on transparency in all aspects of scientific work, it would be prudent to ensure such transparency in funding applications. Therefore, a footnote or some other mechanism could easily be used to indicate which portions of the review, methodology, etc., are derived from a previously submitted application.

Recycling from grant proposal to published paper. Because the readership of a grant proposal is relatively small, the reuse of content from a grant proposal to a published paper probably does not violate the spirit of the reader-writer contract as there is an expectation that such reuse routinely takes place. The same can probably be said for recycling from other non-publishable documents, such as research ethics board applications (i.e., Institutional Review Boards). The principle may also apply to *recycling from same-authored-published-papers-to-grants*. There could conceivably be copyright infringement if the author does not own the copyright to the work from which s/he wants to recycle content. However, as grant proposals are not normally published and only disseminated in limited fashion, it is difficult to imagine that reuse of copyrighted content in a grant proposal would be problematic, especially if such content also contains revisions, even if only minor ones. Two other important factors merit consideration: 1) whether content from the grant that had been recycled from a copyrighted paper is reused in a later paper whose copyright is owned by a different publisher and 2) whether the material being recycled was co-authored by others. If the latter, then written permission for reusing co-authored content might need to be sought and such permission would need to include authorship clarification of the new output that will contain the reused previously co-authored material.

Readers who are experienced grant writers will readily recognize that there are many other possible scenarios related to reuse in the context of grant applications. In thinking about each possible scenario, it may be worth keeping in mind the assumption of novelty in the reader-writer contract. Thus, as indicated above, and in the service of ethical transparency and depending on the particular scenario, an author may wish to consider the appropriateness of including a simple note that alerts the readers as to the nature and extent of any content that has been reused.

GUIDELINE 13: In addition to standard practices of ethical scholarship, authors must be mindful of readers' expectations, applicable issues related to intellectual content rights (i.e., copyright), and, especially, the need to always be transparent in our work when reusing material across the various dissemination domains.

Copyright Law

This document has mentioned copyright at various points throughout. Because some instances of plagiarism and self-plagiarism (e.g., redundant publication) have the potential for violating copyright law, the following section is devoted to a brief review of the concept of copyright.

Copyright law is based on Article 1, sec. 8, cl. 8 of the United States Constitution, the purpose of which is "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." Once owners of an artistic (e.g., song, lyrics, films) or an intellectual work (e.g., book, article) copyright a product, they have the exclusive right to publish, reproduce, sell, distribute, or modify those products. For authors who wish to have their papers published in traditional journals, the typical arrangement is for the copyright of the author's work to be transferred to the publisher of the journal. The journal can then reproduce and distribute the author's work legally. An increasing number of journals now

allow the author to maintain ownership of their work, but both entities sign an agreement specifying the journals' right to publish and re-use the author's material. In the case of "Open Access" journals (freely available to the public without expectation of payment), the author agrees to allow for the free dissemination of his/her works without prior permission.

With some exceptions, the unauthorized use of copyrighted work violates copyright law and represents copyright infringement. Exceptions to copyright infringement fall under the doctrine of "[Fair Use](#)" of copyright law and represent instances in which the activity is largely for nonprofit educational, scholarship, or research purposes (see US Copyright Office, 1996). For example, in some situations, a student or individual researcher may make a copy of a journal article or book chapter for his/her own personal use without asking permission. Likewise, an author describing the results of a published study may take a couple of lines of data from a table from a journal article, include a citation, and reproduce it in his/her paper. The American Medical Association's *Manual of Style* (Iverson, et al., 2007) provides additional examples of instances of "fair use."

Copyright Infringement, fair use, and plagiarism

The use of relatively short direct quotes from a published work does not usually require permission from the copyright holder as it typically falls under the "fair use" provision. However, extensive quoting of text from a copyrighted source can constitute copyright infringement, whether the appropriated text is properly enclosed in quotation marks or correctly paraphrased, even if a citation is provided according to established scholarly conventions. Obviously, the same applies if the material is plagiarized outright. Moreover, the reader should note that intellectual or artistic work does not need to be published in order to be copyrighted. In fact, the moment the work becomes final it is automatically copyrighted. Thus, instances of plagiarism, whether from a published article or even an unpublished manuscript, can also constitute copyright infringement, though, of course, copyright infringement does not always constitute plagiarism. For example, if I were to quote extensively and with proper citation beyond the limit dictated by the publisher of the work from which I quoted, I would be in violation of that publisher's copyright, but the infraction would not constitute plagiarism as I am letting the reader know, by my use of quotations and a citation, that the material being used is not mine.

Iverson, et al., (2007) cautions the reader that the amount of text that can be taken from a copyrighted source without permission depends on its proportion to the entire work. However, the reader should also note that some publishers, such as the APA, have established word limits for borrowing text. Given the above considerations, it should then be clear that extensive plagiarism and self-plagiarism may also qualify as copyright infringement because the copyright of the plagiarized or self-plagiarized content may be held by the publisher; not by the author. This would certainly be the case if the original article were published in a journal owned by one publisher and the second article were to appear in a journal owned by a different publisher both of which require that authors transfer the copyright of their papers to the publishers. One should note that not all publishers require that authors transfer their copyright to them.

Guideline 14: Because some instances of plagiarism, self-plagiarism, and even some writing practices that might otherwise be

acceptable (e.g., extensive paraphrasing or quoting of key elements of a book) can constitute copyright infringement, authors are strongly encouraged to become familiar with basic elements of copyright law.

Cultural-linguistic considerations of plagiarism and self-plagiarism

Plagiarism amongst non English-speaking students has been, in part, attributed to a variety of cultural factors, including their different conceptions of intellectual property, originality and attribution. For example, students from some Asian countries presumably follow ancient traditions of memorizing and copying texts from original sources out of respect for the authority those individuals represent (see Pecorari, 2013, p. 110) and they do so without attribution under the assumption that the reader will already be familiar with the provenance of the material (Bloch 2012, p. 14). Certainly, earlier research suggested that some Asian students may not even be familiar with the concept of plagiarism (see, for example, Decker, 1993), but more recent evidence does suggest that even if they are familiar with the concept, plagiarism may simply be ignored by teachers because such behavior does not seem to be a matter of concern to them (see, for example, Moon 2002). To be fair, such lax attitude toward plagiarism on the part of teaching staff and of students is not confined to Asian nations. Heitman and Litewka (2011), point out how students in Eastern European nations (see Magnus, Polteroich and Danilov, 2002; Pupovac, Bilic-Zulle & Petroveck, 2008) and also Middle East, Latin America, India, and Africa are much more tolerant about issues of misconduct than some Western European nations or the United States (see Vasconcelos, Leta, and Costa, 2009). On the other hand, many of these attitudes may be slowly changing as individual nations and even entire regions attempt to become more competitive in an increasingly global market. For example, Chinese-English bilingual education is growing rapidly in China (Hu, 2008) and, invariably, such instruction will likely lead to wider exposure and familiarity with Western scholarly traditions, including issues related to plagiarism and proper attribution of sources. Other emerging economies (i.e., Brazil) are similarly making great strides toward curbing both, academic and research misconduct (Vasconcelos, et al, 2009).

In addition to cultural variables, Heitman and Litewa (2011) identify two other major factors that predispose some non English speaking individuals to plagiarize: 1) The acceptability of plagiarism in their home environments and 2) vague or non-existent policies on this and related subjects.

With respect to the second point, it should be noted that in most Western, English-speaking nations, secondary, and tertiary academic institutions familiarize students with issues of academic integrity, and plagiarism in particular, via a number of mechanisms, such as in-class verbal admonitions, written academic integrity policies, student honor codes, and similar guidance. Yet, studies repeatedly show that many students from these same nations, including those from North America, admit to plagiarizing at all educational levels, i.e., graduate and professional schools, even though they likely know what plagiarism is and are well-aware that it is wrong. Similarly, most Western academic institutions, funding agencies, professional associations, etc., have written policies in place that identify plagiarism as a form of research misconduct. Yet, plagiarism is one of the most frequent areas of concern for journal editors (Wager, et al., 2009) with a third of retracted journal articles being due to plagiarism or self-plagiarism (Fang, et al., 2012). Some of these retracted papers are from native English-speaking authors who work at Western institutions with strong misconduct

policies.

The academic dishonesty literature can help inform us about factors that can influence whether students will plagiarize. For example, according to Donald McCabe, perhaps the most widely published researcher in this area, one of most important predictors of whether students will cheat is their perception of whether others will do so (McCabe, Treviño, & Butterfield, 2002). Thus, and consistent with Heitman and Litewa's (2011) observation, if there is a perception that others plagiarize and/or that this misbehavior will be tolerated, students are more likely to engage in it, especially if they believe that doing so does not lead to any negative consequences.

Admittedly, some of the evidence does suggest that many native English-speaking students (McGowan & Lightbody, 2008; Power, 2009; Roig, 1997; 1999) and even some professionals (Julliard, 1994; Roig, 2001) are simply not familiar with the nuances of appropriate scholarship. In addition, the evidence also suggests that an important factor that leads writers to misappropriate long strings of text from sources is a combination of uniqueness of the terminology used, etc. (cite sources). To this point, Pecorari (2013) writes: "Most people, from undergraduates in their first term to senior and frequently published scholars, find academic writing challenging because of the high degree of accuracy and precision of expression it requires" (p. 113). It makes sense, then, to suspect that a major factor in the incidence of plagiarism by non-native writers of English lies in these writers' difficulties managing the production of mechanically sound, appropriate grade-level prose in their acquired second language. Consider what is involved in being able to write correctly in a second language: one must be able to memorize the meaning of thousands of words and learn the syntactical rules for combining those words to form grammatically correct sentences. The ease of acquisition will depend on many factors, such as the age and the context in which the second language is acquired, and the educational and linguistic background of the individual. For example, it is probably much easier for someone whose native language uses an European alphabet system than, say, someone who uses an Arabic or Asian system with little to no prior exposure to English. In addition to learning a new language, there is the added step of needing to learn the language (e.g., terminology, technical expressions) of the discipline being studied. Thus, in the context of the sciences, learning to write proper English is not enough. Additionally, the student needs to then learn the unique vocabulary and expressions of the specific discipline in which s/he operates, including the additional requirements for utmost clarity and conciseness demanded by scientific writing.

The "rules" of scholarly-scientific English have a long-standing tradition and are unlikely to change in order to accommodate the needs of non native English writers. However, considering the fact that some native speakers of English will take years to master the production of good scientific writing, it is important for all of us to have some appreciation of how much more difficult it is for most non-native writers of English, who often lack many of the resources available to native speakers, to master this important task. Thus, in the words of Pennycook (1996), "... we need to be flexible, not dogmatic, about where we draw boundaries between acceptable and unacceptable textual borrowings." It is, therefore, essential for all of us to take all of the above considerations into account in judging ethical writing lapses of these linguistic groups.

THE LESSER CRIMES OF WRITING: OTHER QUESTIONABLE WRITING PRACTICES

Zigmond and Fischer (2002) have called attention to what they refer as the “misdemeanors” of science: ethically inappropriate practices in the conduct of scientific research. These authors explain that, whereas fabrication, falsification, and plagiarism are considered to be the “high crimes” of science, many other questionable practices frequently take place and that these lesser crimes should command more attention. Evidence for their position was verified in a study by Martison et al., (2005) who reported have shown that 33% of US scientists surveyed admitted to engage in some form of questionable research practices. Some examples of common misdemeanors are, neglecting to indicate one’s source of funding, failing to identify possible conflicts of interest, and establishing honorary authorship (assigning authorship to an individual whose contributions to the work do not earn him/her such status).

We can apply the high crimes vs. misdemeanors classification in the area of writing. In our previous discussion of plagiarism and self-plagiarism, we described a variety of practices, some of which would undoubtedly be classified as high crimes (e.g., appropriating the ideas or data of someone else without attribution), while others would fall under the misdemeanor category (e.g., inadequate paraphrasing and substantial text recycling). In this section, we turn our attention to other questionable practices that violate the spirit of ethical writing and that mostly fall under Zigmond & Fischer’s (2002) misdemeanor category.

ETHICALLY QUESTIONABLE CITATION PRACTICES

Citations and References

Citations are the notations in the text of a paper that identify the source and/or evidence for our claims and for related research and theories mentioned in the paper. Depending on the style of writing being used these are typically represented as numbers in parentheses or in superscript (e.g., AMA) or as last names with dates (e.g., APA). The list of references is always found at the end of a paper and these contain the full bibliographic information and/or sufficient detail for readers to track down copies of these works (e.g., names of the authors, titles of articles or books, journal title, volume number, pagination and year of publication, Digital Object Identifier [DOI] and Uniform Resource Locator [URL] if required).

Carelessness in citing sources

References play a crucial role in scholarly and scientific writing for they allow the reader to explore in more detail a given line of thinking or evidence. For these reasons, it is important that authors strive for accuracy when listing references in manuscripts. Unfortunately, it appears that some authors do not always give the proper level of attention to citations and reference sections. In fact, the available evidence suggests that a disproportionate number of errors occur in reference sections even in some of the most prestigious biomedical journals (e.g., Siebers and Holt, 2000). Moreover, with the advent of online-only journals and digital stand-alone documents, the temporary nature of some of these works is an emerging problem. That is, a document may be located in one digital domain, only to change domains later and have a different URL. A case in point is this very resource. Originally, the first version of this document resided in a St. John’s University domain address and later migrated to an ORI domain. Often, in situations like this, the source can be located with relatively little effort. However, other digital documents may disappear altogether and can no longer be easily obtained. When a

reference that is used as supporting evidence cannot be accessed, its absence can raise questions about, and/or weakens, the validity of claims that rest upon it.

The importance of citing the original observation

Another area of concern is the failure to cite the author who first reports the phenomenon being studied. Apparently, some authors instead cite later studies that better substantiate the original observation. Often, this outcome is a result of our attempts at being concise or perhaps a journal's limitation on the numbers of references that can be included in an article. Admittedly, some discoveries and their originators are so well-known that they are treated as common knowledge within the immediate domain-specific research community. However, in cases in which the pertinent information may not be generally known, it is important to acknowledge and credit the original discovery. As Zigmond and Fischer (2002) note, failure to cite the original report denies the individual who made the initial discovery his/her due credit.

GUIDELINE 15: Authors are strongly urged to double-check their citations. Specifically, authors should always ensure that each reference notation appearing in the body of the manuscript corresponds to the correct citation listed in the reference section and vice versa and that each source listed in the reference section has been cited at some point in the manuscript. In addition, authors should also ensure that all elements of a citation (e.g., spelling of authors' names, volume number of journal, pagination) are derived directly from the original paper, rather than from a citation that appears on a secondary source. Finally, when appropriate, authors should ensure that credit is given to those authors who first reported the phenomenon being studied.

Inappropriate Manipulation of References

In a later section I discuss the tendency on the part of some authors to provide what others view as a biased review of the relevant literature. That is, in placing their data or theory in the context of existing relevant work, authors sometimes cite only references that are favorable to their position. However, consistent with the basic tenets of ethical writing and scientific objectivity, we have a responsibility to cite all relevant material, even work that may contradict our own position. Failure to do so compromises our professional obligation to remain unbiased and is antithetical to the primary mission of a scientist's search for truth.

Citation Stuffing. Another inappropriate use of references occurs when authors intentionally cite their own work, regardless of its relevance, in an attempt to manipulate their own articles' impact factor. Although several criticisms of this measure have emerged over the years (Khaled, 2015; Rossner, Van Epps, & Hill, 2007), the impact factor, which takes into account how often articles published in those journals are cited, continues to be used as a measure of importance and prestige by journals. Likewise, a measure of the number of times a journal article is cited in other articles can also be used as an estimation of its importance in an individuals' tenure and review decisions, thus the tendency of some authors to weave into their paper references of their own prior work that may be of

limited relevance to the actual topic of the paper.

A related matter involves the inappropriate inclusion of references that are authored by individuals thought to be likely peer reviewers of the article in question, the thought being that a reviewer will be more likely to give a favorable review to a paper that cites his or her own work than to one that does not.

Finally, there is some evidence that editors of some journals sometimes insist that authors include references from their journal for the mere purpose of enhancing that journal's impact factor (Wilhite & Fong, 2012). Authors should attempt to resist such requests unless the editors' or reviewers' recommendations are genuinely relevant to their paper.

GUIDELINE 16: The references used in a paper should only be those that are directly related to its contents. The intentional inclusion of references of questionable relevance for purposes such as manipulating a journal's or a paper's impact factor or a paper's chances of acceptance, is an unacceptable practice.

Relying on an abstract or a preliminary version of a paper while citing the published version. At the beginning of this instructional resource we identified clarity, conciseness, accuracy, and integrity as essential elements of scientific writing. Unfortunately, the latter two concepts are sometimes overlooked with certain citation practices. Consider what can happen in the following scenario. A researcher needs to conduct a literature review for a manuscript that she will be submitting for publication to a biomedical journal. A literature search yields several useful abstracts and the researcher proceeds to track down the various journal articles. Unfortunately, one key article is not available online. It is not carried by her institution's library, nor is it available at nearby libraries as it has been published as a technical report in an obscure nontraditional journal with limited circulation. Pressed for time, the researcher decides, instead, to rely on material from the abstract for the literature review and includes the journal article citation in the reference section. However, nowhere in the paper does she reveal that she relied on the abstract and not on the actual journal article.

Another variation of this problem occurs when the researcher cites the published version of the paper, but actually relies on the contents of an earlier version that was published in the proceedings of a conference, or the preliminary version that had been distributed at the conference presentation itself or a pre-print server. These behaviors violate the requisites of accuracy and integrity.

The main problem with relying on versions other than the published paper is that elements of these earlier versions may be different from their counterparts in the published version of the paper. Such changes are typically the result of the peer review process, editorial changes, or errors that are spotted and corrected by the author between the time the paper is presented at a conference and the time that it is subsequently published. In some cases, the published version will contain additional data and/or interpretations that are substantially different or perhaps even contrary to those of earlier versions. For example, a conference paper describing experimental data may, in its published form, contain additional data from a new experimental condition or new statistical analyses that were carried out in response to referees' suggestions. Data from

the new condition can place the earlier data in a new perspective possibly leading to somewhat different interpretations. With respect to abstracts, relying on such summaries can be problematic because abstracts typically may not provide sufficient details about the paper's relevance (i.e., Taylor, 2002). In addition, because of their condensed form, abstracts cannot provide essential details about a study's methodology, and results. Moreover, it should be noted that in some databases there may be instances in which individuals other than the author/s of the journal article write the article's abstract. As a result, subtle misrepresentations are likely more common with these abstracts. Writing guidelines, such as the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*, discourage the use of abstracts as references.

Lastly, given the rise in retractions and corrections, authors must ensure that the evidence cited is up-to-date. Regrettably, a significant number of retracted papers continue to be cited in the literature (see Ferguson, 2015). In addition, the large number of corrections, errata, etc., issued each year suggests that a substantial number of uncorrected results and/or interpretations are being cited as legitimate evidence and both of these outcomes contribute to the further contamination of the scientific record.

GUIDELINE 17: Always cite the actual worked that is consulted. When the published paper cannot be obtained, cite the specific version of the material being used whether it is conference presentation, abstract, or an unpublished manuscript. Ensure that the cited work has not been subsequently corrected or retracted.

Citing sources that were not read or thoroughly understood. The practice of relying on a published paper's abstract to describe its contents also fits in the present category. However, there are other scenarios that better illustrate the practice of citing papers that were either poorly understood or perhaps not even read by the author citing them. Below are a couple of examples:

Consider an investigator who is in the process of writing the results of a series of studies he conducted. In his search for background literature relevant to his work, he finds one particular journal article whose introduction cites a number of other works that seem very relevant to his own paper. Although he recognizes most of the references cited, there are a couple of papers that he is not familiar with and, for a variety of reasons, he cannot obtain copies of them at this point. Given the context of the published paper's description of these two other papers that are unfamiliar to him, our author decides to include them in his own review of the literature by paraphrasing the relevant portions of the published paper's introduction that summarize the contributions of these two unfamiliar (to him) papers. He then includes these papers as references in his manuscript's reference section, along with that of the journal article from which he derived the information. Finally, although our author cites the published article in at least one other context, he does not indicate that this article had served as the source of the information from the two other papers, which he had never read.

By not revealing the true source of the paraphrased content from these two papers, the reader is deceived by falsely assuming that the brief summary of these two papers was based on the author's reading of them. Technically, this type of transgression could conceivably qualify as a form of plagiarism because the author has paraphrased a summary

of another's work, but attributed his summary to the author of the journal article. Of course, a formal charge of plagiarism would depend on a number of variables, such as the amount of paraphrasing that took place without proper attribution, the significance or uniqueness of the material involved, etc.

This type of deceptive citation practice can also be risky because of the possibility that other key aspects of the papers cited (but which were not read) do not quite support the offending author's thesis. Therefore, there may be significant lapses in his rationale for the study. Inexperienced students sometimes use this short-cut when given the task of reviewing the literature on a given topic. In their search for relevant literature, they may come upon a published paper that reviews roughly the same literature that the student has been tasked to summarize. In an effort to optimize his time, and given the great cognitive effort needed to read, assimilate, and synthesize the literature into a coherent summary, some students will rely primarily on the published review and paraphrase its contents in such a deceptive manner as to give the appearance that he has read and summarized the research. To maintain the deception, the student will include in his/her paper's reference section many of the sources cited in the published review, including perhaps the article from which all of the material was taken. Again, this strategy misleads the reader (i.e., the professor) into assuming that the student has actually read all of the papers cited in his/her review when, in fact, he has not. Ironically, these transgressions are typically uncovered, not only because the students' paraphrases are often too close to the original, thus betraying the students' less sophisticated writing, but also because at least some of the papers cited are perhaps known to their professor to only be tangentially supportive of the students' main thesis. Other clues in the quality of the writing often point to the deception that the student did not really review the pertinent literature.

The reader should note, however, that there might be instances in which the practice of citing sources that were not read may be acceptable. For example, an author may simply wish to point out a well-known discovery or theory and provide the reader with the original citation. When this is done without misleading the reader into believing that the author read the paper detailing the discovery and is thoroughly acquainted with its contents, then no real harm is done. For example, in a paper on intelligence testing I may want to refer the reader to the psychometric properties of the X test and write: "for a review of validity of reliability of X test see reference Y". Although I am clearly aware that reference Y reviews validity and reliability for various intelligence tests, including test X, my citation of this work does not imply that I have read and processed its contents. I am merely aware that relevant material may be found in that reference and point the reader to it. However, if in a different paper I were to write that "Smith (1879) studied the effects of X on Y and concluded that X is as important as Z and both are critical causal variables in the incidence of Y" such a statement strongly suggests that my summary of the study is, in fact, based on my reading of that paper.

GUIDELINE 18: Generally, when describing others' work, do not cite an original paper if you are only relying on a secondary summary of that paper. Doing so is a deceptive practice, reflects poor scholarly standards, and can lead to a flawed description of the work described.

Some writing manuals have spelled out specific conventions to deal with a situation when an important paper relevant to one's manuscript contains a reference that we would like to cite, but is not available to us. One such writing manual, is the current edition of the *Style Manual of the American Psychological Association* (American

Psychological Association, 2010) which offers a simple strategy for authors who need to cite a source that is not available to them, but that is contained within another source (as described earlier). Let's say that our author had read about the work of Smith from a paper published in 1999 in an article authored by Rodriguez that was published in 2015.

According to the APA Manual the author can use this material by stating as follows: "According to Smith (1999; as cited in Rodriguez, 2015) an important variable ..." The reader may have noticed that I have already relied on this strategy elsewhere in this instructional resource.

There is at least one other inappropriate citation practice that merits mentioning. Consider the situation in which a "landmark" paper, whose contributions are relatively well known, needs to be cited in a manuscript. The author, a senior researcher with a lengthy publication record cannot readily find a copy of the paper, but he knows that he has read it at least once, back in his graduate school days, and has cited it before, as he is very familiar with it. In summarizing the contents of this landmark paper, the author relies on his recollection of its contents based on his prior reading of the paper and on summaries published by others. After all, this is a paper that is widely known throughout the discipline. The problem with the above situation is that there is a strong possibility that our recollection of subtle details about a paper read at a much earlier time is probably less than optimal. In addition, even though we may have read about those same details via secondary sources, these may have inadvertently slanted or distorted important details of the work, particularly if the material in question is of a controversial nature. Even if the material is accurately described elsewhere, the different contexts in which it is read may lead to differences in how that material is encoded in our minds which, therefore, could lead to difference in how certain elements are recalled. Taken together, these factors can ultimately result in the dissemination of faulty information.

An excellent example of this type of problem within the social sciences concerns current descriptions of a famous demonstration carried out by psychologists John B. Watson and Rosalie Rayner (1920) in which an infant known as "Little Albert" was conditioned to fear a rat. Watson and Rayner's demonstration with Little Albert is cited in a large proportion of introductory psychology textbooks and in many other textbooks within that discipline and beyond (e.g., education, nursing). However, according to Paul and Blumenthal (1989), investigators have pointed out a number of serious flaws in this classic demonstration and have shown how, over the years, various elements of the demonstration have become distorted. For example, some descriptions of Little Albert indicate that Watson & Rayner used a white rabbit rather than a white rat. In explaining the continued presence of this classic demonstration in textbooks without mention of the flaws, Paul and Blumenthal state:

"Textbook authors are under considerable pressure to keep their references current. An author who cites older works will often be instructed by manuscript reviewers and editors to consult the current literature. Most surely do. But from the evidence of the texts, others simply update their citations or lists of 'suggestion for further reading.' As a result, references in introductory textbooks sometimes bear little relationship to authors' substantive discussions. Indeed, citation may directly contradict claims asserted in the text." (p. 551).

Interestingly, factual errors, albeit mostly minor in scope, concerning the story of Little Albert continue to be found in introductory texts that cover this

material (Harris, 2011).

GUIDELINE 19: If an author must rely on a secondary source (e.g., textbook) to describe the contents of a primary source (e.g., an empirical journal article), s/he should consult writing manuals used in her discipline to follow the proper convention to do so. Above all, always indicate to the reader the actual source of the information being reported.

Borrowing extensively from a source but only acknowledging a small portion of what is borrowed. When we write a review of the literature in the biological and social sciences we often summarize the ideas or data of each source we consult. Such summaries can range from one or more sentences to perhaps two or more paragraphs. Of course, we must also include citations within these summaries to alert the reader as to the source of the material we are presenting. Thus, a typical review of the literature is sprinkled with many citations. There are instances, however, when an author might need to draw heavily from a single source. In these cases, acknowledging the source of the material can be challenging for some inexperienced writers. For example, in some cases inexperienced writers will add the same citation liberally in several places within the summarized text to ensure that the material is properly credited. However, this technique looks awkward, which is why readers will typically not see the same reference appear every few sentences throughout the paragraph or paragraphs in which the same work is being discussed. Experienced writers avoid the overuse of the same citation by providing only one or two citations strategically placed throughout the portion of text derived from that single source, and by carefully crafting the writing to indicate to the reader that the ideas expressed are not the author's. For example, one can name the authors (e.g., "According to so-and-so ..."; "These authors also suggest ..."; "Their study also revealed ..."). Some authors, however, are not as consistently conscientious about crediting their sources and will sometimes inadvertently intersperse their ideas with those of the secondary source. The result is that the reader is uncertain where the contributions of the source end and those of the manuscript's author begin (see Iverson, et al., 2007, p. 158). In the event that the resulting text leads the reader to identify the borrowed ideas as belonging to the manuscript's author, the author faces the risk of being accused of plagiarism.

GUIDELINE 20: When borrowing heavily from a source, authors should always craft their writing in a way that makes clear to readers which ideas/data are their own and which are derived from sources being consulted.

ENSURING RESPONSIBLE WRITING PRACTICES

Responsible science and scholarship entail the highest degree of objectivity in reporting the results of our research. Most authors will make every effort to describe their observations without exaggerating the importance of the findings or overstating their conclusions, sometimes with the assistance of the journal referees. However, lapses in objectivity when presenting research to a general audience have been noted in journal articles (see Cummings & Rivara, 2012) and, especially in institutional press releases that

are later used by science writers to describe the latest research findings. For example, Woloshin and Schwartz (2002) have carried out an analysis of press releases and reported that such documents often fail to emphasize the limitations of the studies. These authors noted that “[d]ata are often presented using formats that may exaggerate the perceived importance of findings.” Their results are noteworthy because, in some cases, study authors are consulted during the editorial stages of producing a press release. The hype surrounding scientific findings, particularly those related to health and technology, can inflate public expectations about new treatment possibilities and other technological advances. Thus, we face a real risk of further erosion in the public’s trust in science if the promises of these findings fall short (Master and Resnik, 2011)

Selective reporting of literature, One of the main purposes of reviewing the relevant literature and citing others’ work is to provide empirical and/or theoretical support for one’s thesis, be it a paper for a course we are taking, a grant application, a doctoral dissertation, or a paper targeted for publication in a scientific journal. The literature review provides readers with the proper context to understand a proposed study or theory by informing them of important issues, such as the current state of knowledge on the topic, the type of methodologies being used in the area, the theoretical underpinnings of the research, and the significance of the problem. Depending on the type of manuscript under development, the literature review will be either comprehensive (e.g., doctoral dissertation, review article) or very succinct (e.g., journal article). The latter situation presents a unique challenge because even though the cost of online publication is relatively inexpensive, print journal space can still be expensive forcing authors to be concise in their writing (thus the move toward online supplemental material).

For aspiring scholars and scientists, the classroom represents the training ground for future professionals. As a result, professors tailor the requirements for academic papers assigned in many graduate and advanced undergraduate courses to those demanded by scholarly journals (see for example, Salazar, 1993). These constraints sometimes present a real challenge for authors, who must always make an effort to simplify their literature reviews and only include a concise summary of highly relevant papers.

Obviously, literature cited in support of our hypotheses must be grounded in sound arguments, tight research methodologies, and flawless data. Citing references known to be methodologically or logically deficient in support of our work is ethically problematic, particularly if we fail to mention these shortcomings. Likewise, if in our search for relevant literature we become aware of important relevant evidence that runs contrary to our data or point of view, we have an ethical obligation to cite such evidence, either in the introduction or the discussion section of our paper. We must not do this dismissively, but in an unbiased manner. Of course, there are situations in which the extent of our examination of the literature is limited by publishing concerns specific to the type of articles proposed (e.g., short communication, brief report, letter to the editor). Space limitations in such contexts may render it impractical to provide adequate coverage of relevant literature, let alone contrary evidence.

The main purpose of an introductory section of a manuscript is to describe the problem being investigated and the relevant research/and or scholarship on the subject. Based on the rapid pace at which some areas in science and scholarship continue to grow, authors are not always able to cite all of the relevant literature, either because of space constraints or their inability to simply keep up with the burgeoning literature. On the other hand, some authors will deliberately leave out pertinent literature, for a variety of reasons. Thus a perusal of scholarly journals that accept letters to the editor as commentaries to

recently published articles will reveal instances in which such seemingly intentional writing lapses are fairly common (see [Goodman, 1998](#); [Perkin, 1999](#); Nathan, 1994).

GUIDELINE 21: When appropriate, authors have an ethical responsibility to report evidence that runs contrary to their point of view. In addition, evidence that we use in support of our position must be methodologically sound. When citing supporting studies that suffer from methodological, statistical, or other types of shortcomings, such flaws must be pointed out to the reader.

Selective reporting of methodology. Replication of others' research is one of the hallmarks of the scientific enterprise. As such, scientists and scholars have a professional obligation to inform others about the specific procedures used in their research. This information is found in the methods section of a research paper, the purpose of which is to provide other researchers with sufficient details about the study so that anyone who wishes to verify the results will have the necessary information to do so. In the methods section we identify the subjects of our study (e.g., select clinical population, specific species of animals) and provide important details about characteristics of the sample, such as how subjects were recruited, that are relevant to the variables that are being manipulated and measured.

The Methods section also contains description of instrumentation or other observational and measuring techniques that are used to obtain the outcomes reported. Whether data were collected using sophisticated instrumentation, such as a positron emission tomography or via a simple paper-and-pencil questionnaire, scientists must describe these materials with sufficient detail to allow others to carry out the study and verify the results.

Perhaps the most important part of a Methods section is the description of the actual procedure used to carry out the study. Here, investigators must explain in clear language the series of steps used to establish, observe, and/or manipulate all relevant variables. They must offer a complete description of the testing conditions and all of the other necessary details that would allow an independent investigator to carry out the exact same study again. Admittedly, some studies may include several highly complex components that are carried out by different members of a research team. Nonetheless, it is essential that all key details and steps be described in this section in a most clear manner. The inadvertent omission or ambiguous presentation of a single step or piece of information may doom to failure the replication efforts of other researchers, thus needlessly wasting valuable time and resources. Obviously, a more serious offense occurs when an author intentionally leaves out an important detail about the procedure or fails to report a crucial event that altered the conditions of the study. There may be several reasons why some authors will knowingly leave important details out of a research report (e.g., assumed irrelevance, perceived minimal impact). Perhaps an extraneous variable was inadvertently introduced late into the study while it was still in progress leading to biased results. Thus, for the sake of expediency, rather than discarding the biased results and starting all over again, the investigator may inappropriately leave that major detail out of the report. The important point here is that authors have an ethical obligation to describe all of the important aspects of the research conducted, even if some of those details reflect poorly on the abilities of any member of the research team.

Because of the concern that some investigators may at times omit important details of the methodology used, guidelines have been formulated to help authors write better research reports. For example, for reports describing randomized control trials authors are advised to consult Moher, Schultz, and Altman's (2001) [Consort statement](#), which is a set of guidelines designed to improve the quality of such reports.

GUIDELINE 22: Authors have an ethical obligation to report all aspects of the study that may impact the replicability of their research by independent observers.

Selective reporting of results. Designing an empirical study takes planning and careful consideration of existing theory and research in the area under investigation. When testing for simple causal relationships, it should be relatively easy to predict the specific outcome when producing a change in the causal variable. Most modern scientific investigations, however, are far from simple- they often involve several variables all of which interact in ways that are sometimes difficult, if not impossible, to predict. One positive feature of complex studies is that they can yield many interesting outcomes, though some of these outcomes may end up being irrelevant or even contrary to our expectations. When the latter happens, there may be a temptation to try different statistical analyses and select the one that best fits our hypothesized results (e.g., using a less powerful statistical test, removing outliers). Another temptation is to simply not report null results or only report those statistically significant results that are consistent with our hypotheses. Other techniques, such as the manipulation of graphs, have been used to subtly change, and therefore distort, the visual presentation of results in a way that make them more consistent with our expected findings. Such practices are almost always fundamentally deceptive and are contrary to the basic scholarly-scientific mission of searching for truth. However, there are instances in which practices, such as the removal of outliers, are acceptable, but only when the author follows established procedures, informs readers of these actions, and provides a cogent rationale for carrying them out.

GUIDELINE 23: Researchers have an ethical responsibility to report the results of their studies according to their a priori plans. Any post hoc manipulations that may alter the results initially obtained, such as the elimination of outliers or the use of alternative statistical techniques, must be clearly described along with an acceptable rationale for using such techniques.

AUTHORSHIP ISSUES AND CONFLICTS OF INTEREST

An instructional resource on scholarly and scientific writing would not be complete without some discussion of conflicts of interest and authorship issues. We now turn our attention to these matters.

Advances in biotechnology, communication, instrumentation, and computing have allowed scientists to investigate increasingly complex problems. It is not uncommon these days for large-scale investigations to be carried out by teams of scientists from various institutions sometimes spanning two or more continents. Groups and individual contributors may work on the same or different key aspects of a project and these

collaborations will invariably result in multiple-authored publications. Unfortunately, some of these collaborative efforts have given rise to disputes about authorship issues. The most frequent disputes center around the following questions: 1) Which members of a research team merit authorship? 2) Who is designated as senior or corresponding author of the resulting journal article? And 3) How should the rest of the authorship order be determined?

Given that authorship, particularly the designation of senior author of a paper in scientific and scholarly publications plays such a prominent role in the current merit system, it is extremely important to have sound criteria for establishing authorship. For example, in writing about these issues, Steinbok (1995) questions whether various situational roles in biomedical research merit authorship. He writes: “Should the head of the department automatically be an author? Should the various clinicians involved in the care of the patients who are subjects of a paper automatically be authors? What about the person who goes through a set of charts and puts information into a database? What about the statistician who analyzes the data?” (p. 324). Others have raised questions related to the current trend for graduate and undergraduate students to be directly involved in research and in the authoring of papers.

Fortunately, individuals and a number of professional societies have proposed relevant guidelines in this area (e.g., ICMJE and other references in a later section). Although these sets of guidelines have similar criteria for authorship, there is sufficient overlap to offer readers a certain number of sensible recommendations. In considering these guidelines, readers are advised to consult their professional associations for any specific authorship guidance that these entities may have developed. Readers are also advised to consult the institutions with which they are affiliated, as well as the individual journals to which they intend to submit a manuscript.

Deciding on authorship. Whether students or professionals, individuals collaborating on a research project should discuss authorship issues, such as who will be designated as senior author, the order of other authors, and any other individual acknowledgements for other contributions, before initiating work on the project. All parties should familiarize themselves with authorship guidelines suggested by their respective disciplines. In the absence of such guidelines, prospective authors should follow the guidelines of the [International Committee of Medical Journal Editors](#). Any agreement reached regarding authorship should, ideally, be recorded in writing and should outline the formula used for determining who the senior author should be while also establishing the authorship order for the rest of the investigators involved in the project. The agreement should be sufficiently flexible to accommodate changes that may arise while the project is in progress (e.g., an individual not initially designated as author ends up making substantive contributions that earn her authorship in the paper, or an individual previously designated as author fails to carry out the designated duties, making his/her contributions not sufficiently or importantly enough to merit authorship).

GUIDELINE 24: Authorship determination should be discussed prior to commencing research collaboration and should be based on established guidelines, such as those of the International Committee of Medical Journal Editors.

Establishing authorship. Generally, and as per the guidelines of the International

Committee of Medical Journal Editors, only individuals who make substantive intellectual contributions to the project should be listed as authors and the order of authorship should be based on the degree of importance of each author's contribution to the project. The latter may be difficult to establish in disciplines such as genomics where teams of several dozen, hundreds, or perhaps several thousand contributors (i.e., particle physics), may be authors in a single paper (see [Castelvecchi, 2015](#)). Authorship usually entails the ability to publicly take responsibility for the contents of the project (e.g., being sufficiently knowledgeable about the project to be able to present it in a formal forum). What determines whether a contribution is substantive or not is a matter of debate and, technically, it should not matter whether the aim of the collaboration is an internal technical report, a conference presentation, or an article targeted for refereed journal. Generally, examples of substantive contributions include, but are not limited to, aiding in the conceptualization of the hypotheses, designing the methodology of the investigation and significantly contributing to the writing the manuscript. "Menial" activities, such as entering information in a database or merely collecting actual data (e.g., running subjects, collecting specimens, distributing and collecting questionnaires) are not, by themselves, sufficient grounds for authorship, but should be acknowledged in a footnote. In addition, "honorary" or "courtesy" authorship assigned on the basis of some leadership position (e.g., such as being head of the department where the research is carried out) must also be avoided.

GUIDELINE 25: Only those individuals who have made substantive contributions to a project merit authorship in a paper.

Authorship in faculty-student collaborations. Undergraduates, and certainly graduate students, are increasingly involved in research collaboration with their faculty. Along with high grade point averages and scores on standardized testing, undergraduate research experiences are one of the most valued criteria for advanced graduate training. As a result, an increasing number of undergraduates are becoming involved in research and even authoring journal articles. Their participation in the research process raises the question as to whether current authorship guidelines that have been designed for professionals should be equally applicable to students. Fine and Kurdek (1993) who have written on these issues, offer the following sensible remarks

"To be included as an author on a scholarly publication, a student should, in a cumulative sense, make a professional contribution that is creative and intellectual in nature, that is integral to completion of the paper, and that requires an overarching perspective of the project. Examples of professional contributions include developing the research design, writing portions of the manuscript, integrating diverse theoretical perspectives, developing new conceptual models, designing assessments, contributing to data analysis decision and interpreting results ..." (p. 1145).

Faculty mentors may view the above guidelines for students as rather harsh. However, consider part of the rationale for these authors' position that awarding authorship to an undeserving student is unethical:

"First, a publication on one's record that is not legitimately earned may falsely represent the individual's scholarly expertise. Second, if because he or she is now a published author, the student is perceived as being more skilled than a peer who is not published, the student is given an unfair advantage professionally. Finally, if the student is perceived to have a level of competence that he or she does not actually have, he or she will be expected to accomplish tasks that may be outside

the student's range of expertise" (p. 1143).

On the other hand, there is evidence suggesting that students' earned authorship credit is sometimes underrepresented or outright denied by supervising faculty (Swazey, Anderson, & Lewis, 1993; Tarnow, 1999). Clearly, such outcomes are highly unethical as they rob the deserving student of their due credit.

GUIDELINE 26: Faculty-student collaborations should follow the same criteria to establish authorship. Mentors must exercise great care to neither award authorship to students whose contributions do not merit it, nor to deny authorship and due credit to the work of students.

Ghost Authorship. Ghost authorship occurs when a written work fails to identify individuals who made significant contributions to the research and writing of that work. Although in recent times this unethical practice is typically associated with the pharmaceutical and biomedical device industry, the term is also applicable in a number of other contexts. For example, in academic contexts, it is widely recognized as cheating to have someone other than the named student author write a paper that is then submitted as the student's own. Perhaps with some exceptions (e.g., speech writers), ghost authorship is ethically unacceptable because the reader is misled as to the actual contributions made by the named author.

Academic Ghost Authorship. A not uncommon form of academic dishonesty that has probably always existed is to have someone else other than the student (e.g., a friend or relative), complete an assignment or write a paper. Several Internet sites now exist that, in addition to making available copies of papers that have already been written, also provide custom-written papers, including doctoral theses. The customer (i.e., student) specifies the topic and other requirements for the paper and, for a fee, a staff writer for the service will supply the custom-written product. Anecdotal evidence suggests that these practices are not all that uncommon, particularly for those students with the financial means to hire these ghost authors. For an eye-opening account of how this practice works even before the proliferation of on-line paper mill sites, I refer the reader to Whitherspoon's (1995) personal account as a ghostwriter. More recent accounts of this emerging industry are provided by Dante (2010) and Shahghasemi and Akhavan (2015).

Situations in which authors, whether students or professionals, find themselves in need of extensive external assistance with their writing can also raise some interesting ethical dilemmas. For example, consider the doctoral candidate who, because of limited writing skills and/or considerable financial resources, relies heavily on an individual or editorial service resulting in someone other than the doctoral candidate making substantial editorial changes to the writing of the thesis. Such a situation may be acceptable as long as the author of the thesis indicates in a byline or acknowledgement section the full extent of others' assistance. This, however, is not always done. One of the reasons is that such acknowledgement would obviously reflect negatively on the author by possibly suggesting that s/he might not have the necessary skills expected of a doctoral candidate. By mischaracterizing or by failing to acknowledge altogether the high level of assistance received, students falsely portray a level of academic competence that they either do not have or did not practice. In instances in which doctoral students anticipate relying on external assistance to help with the writing of a thesis or even term paper, it is strongly recommended that they confer with their thesis committee, supervisor, or professor to determine the

accepted parameters of such assistance and to fully disclose the nature of the assistance received.

Professional Ghost Authorship. In the literary world ghost authorship is most often associated with celebrity-authored works in which a celebrity, together with a skilled writer, produce written products, such as an autobiography or a memoir. Although much of the writing may be done by the ghost writer whose contributions may not always be acknowledged and, consequently, in those instances the reader is misled into believing that the celebrity is the sole author of the work.

In the biomedical sciences ghost writing has become particularly problematic (see Ngai, Gold, Gill, & Rochon, 2005). For example, in a typical scenario, a pharmaceutical or medical device company will hire an outside researcher with known expertise in the company's line of products (e.g., antidepressants) to write a "balanced" review of their product. To facilitate the write-up of the paper, the company furnishes the expert with a draft of the paper that had already been prepared by a ghost author employed by the company. And, as it often happens with industry-sponsored research, the resulting paper ends up portraying the product in a more favorable light than in reality it might deserve (Bekelman, Li, & Gross, 2003). It is important to highlight the distinction between ghost writers and medical writers. As Woolley (2008) points out, medical writers are professionals who assist researchers in the preparation of manuscripts. They abide by a professional code of ethics that includes full disclosure in the publication as to the medical writer's involvement and funding source (see American Medical Writers Association, 2008; or the ethical guidelines of the European Medical Writers Association, Jacobs & Wager, 2005).

The extent of ghost contributions can range from the initial draft framing of a manuscript to the complete or nearly complete write-up of the paper. In addition to the obscuring of the true authorship of these works, the extent to which the writing encourages bias toward a particular product or point of view emerges as a concern. In the past few years, several articles and editorials have condemned the practice as ethically questionable (e.g., The PLoS Medicine Editors, 2009; Sismondo & Doucet, 2010). The [World Association of Medical Editors \(2005\)](#) has produced a [position statement](#), which considers ghost authorship dishonest and unacceptable.

GUIDELINE 27: Academic or professional ghost authorship in the sciences is ethically unacceptable.

A brief overview on Conflict of Interests

When an investigator's relationship to an organization affects, or gives the appearance of affecting, his/her objectivity in the conduct of scholarly or scientific research, a conflict of interest is said to occur. The relationship does not have to be a personal nor a financial one. For example, a conflict of interest could arise when a family member of a researcher is associated with an organization whose product the researcher is in the process of evaluating. Does the family member's association with the organization compromise his ability to carry out the evaluation objectively? Perhaps. Let's consider another example. Imagine an investigator who has been conducting basic science on the various processes involved in the release of certain neurotransmitters and whose work has been steadily funded by the maker of one of the most popular antidepressants. Now

imagine a new situation where the research carried out by that investigator naturally leads him to study the efficacy of that same antidepressant while being funded by the company that manufactures it. In conducting the research, is that investigator's objectivity affected by his long-standing relationship to the drug company? Perhaps

Naturally, some conflicts of interest are unavoidable and having a conflict of interest is not in itself unethical. However, industry has played an increasing role in sponsoring research that bears on commercial applications, leading to a focus on how such sponsorship affects the research process and outcomes. The situation appears to be particularly serious in the realm of pharmaceutical research. For example, Stelfox, Chua, O'Rourke, and Detsky (1998) collected a sample of published reports (e.g., studies, letters to the editor) on the safety of calcium channel blockers, drugs used to treat cardiovascular disease, and correlated the authors' conclusions about their efficacy with whether or not the investigators had received financial support from companies that manufacture those types of drugs. The results revealed a strong association between conclusions that were supportive of the drugs and prior financial support from companies that were associated with those types of drugs. Other studies have similarly shown these types of troubling relationships (e.g., Lexchin, Bero, Djulbegovic, & Clark, 2003; Lundh, Sismondo, Lexchin, Busuioc, & Bero, 2012).

To ameliorate the situation, research institutions, professional societies, and an increasing number of journals have formulated guidelines for dealing with potential conflicts of interest. Essentially, most of these guidelines require authors to disclose such conflicts either in the cover letter to the editor of the journal to which an investigator submits a manuscript and/or ideally in a footnote on the manuscript itself. For additional guidance on this important topic, the reader should consult the various resources offered by ORI, <https://ori.hhs.gov/conflicts-interest-and-commitment>.

GUIDELINE 28: Authors must become aware of possible conflicts of interest in their own research and to make every effort to disclose those situations (e.g., stock ownership, consulting agreements to the sponsoring organization) that may pose actual or potential conflicts of interest.

Acknowledgements

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Paraphrasing/Plagiarism Exercise

Earlier, when we covered paraphrasing and plagiarism, we offered various examples of properly paraphrased and plagiarized text. Because inappropriate paraphrasing appears to be one of the most common forms of plagiarism it is important that contributors to the scientific literature become sensitive to this problem and integrate proper paraphrasing practices in their writing. To that effect, an exercise has been developed for the purpose of offering instruction on acceptable paraphrasing strategies.

For this exercise, the reader is asked to imagine the following scenario: you are working on a manuscript in which you review published studies on the colony raiding behavior of fire ants, *S. invicta*. One of the journal articles you are reading for your review contains a short paragraph that you deem very important and thus, you decide that you want to include the information in your manuscript. Here is the paragraph:

This study examines whether workers of S. invicta are able to assist their mothers in colony usurpations. First we tested whether [queens] of S. invicta are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.¹

¹Balas M, Adams ES, 1996. Intraspecific usurpation of incipient fire ant colonies. Behav Ecol 8:99-103.

You could copy the above paragraph verbatim, enclose it in quotation marks, and include it in your manuscript. But while the use of quoted text is fairly common practice in certain disciplines within the humanities, the practice is typically shunned by most authors and editors of biomedical journals. Another option would be for you to summarize the important points of the above paragraph by condensing it into one or two shorter sentences that fully capture the essence of the ideas being conveyed. However, let's assume that your intention is to paraphrase the entire paragraph, thereby preserving all of the information contained in the paragraph. How would you paraphrase the paragraph without committing plagiarism and in a manner that is consistent with the principles of ethical writing?

For the first part of this exercise, please paraphrase the above paragraph to the best of your ability. Take your time and use whatever resources you deem necessary (e.g., dictionary, thesaurus). Before commencing, keep in mind that when paraphrasing you must substantially modify the original text while preserving the exact meaning of the ideas conveyed in the original paragraph. You should note that when faced with the task of paraphrasing text, many individuals often complain that the reason their paraphrases are too close to the original is because there are only a limited number of ways that one can express the same thought. Although this may be true to some extent when the original text is comprised of highly technical language, such as the paragraph on mammalian histone lysine methyltransferase used earlier in our discussion of plagiarism, it is not true for most other writing. It is certainly not true for the sample paragraph on fire ants that we have selected.

You should also remember that your paraphrase must also indicate the source of the

original material. This is typically done with either a footnote or with some form of parenthetical notation indicating the source of the original. For example, in the style suggested by the American Psychological Association, you might insert the following at the end of your paraphrase: (Balas and Adams, 1996). For this exercise, please assume that your paraphrase contains the proper reference notation indicating the source of the material. You should also assume that a full citation has been placed in the reference section of your paper.

Use the space below to paraphrase the paragraph:

The second part of the exercise will help you to determine whether your rewritten version of the paragraph meets the requirements of an appropriate paraphrase. For this portion of the exercise, you are to place yourself in the same scenario as described above: That you are writing a paper on the ecology and behavior of fire ants and that you discover a paragraph that you wish to paraphrase in your paper.

Below you will find several rewritten versions of the original paragraph. Please examine each version and determine whether it has been properly paraphrased or whether it constitutes an instance of potential plagiarism. As you consider each rewritten version, please assume that you have already incorporated it into your manuscript and that you are now reviewing that section of your paper for accuracy and proper scholarship. Immediately after you select your answer you will be given feedback as to the correctness of your responses.

ORIGINAL PARAGRAPH

*“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”*

REWRITTEN VERSION 1:

A study was conducted to examine whether workers of *S. invicta* can assist their mothers in colony usurpations. The first hypothesis tested was whether queens of *S. invicta* are better able to usurp colonies to which their daughters have moved. For the second

hypothesis, the researchers tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. The researchers observed aggressive behavior during these usurpation attempts to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.

Please indicate whether the above paragraph is:

1. Properly paraphrased.
2. Definitely plagiarized.
3. Cannot determine.

FEEDBACK: This rewritten version is definitely plagiarized. The author has merely added or substituted a few words at the beginning of each sentence, and copied verbatim the remainder of the sentences. Notice that although none of the sentences in the rewritten paragraph are identical to their counterparts in the original, the rewritten version is still deemed as an instance of plagiarism because the author has simply appropriated too many phrases from the original. Thus, the attempted paraphrase falls way short of the requirement for the original text to be thoroughly modified. This is a clear-cut case of plagiarism. See the following tables for comparisons between the original paragraph and its rewritten counterpart.

ORIGINAL VERSION

“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”

PLAGIARIZED VERSION

A study was conducted to examine whether workers of *S. invicta* can assist their mothers in colony usurpations. The first hypothesis tested was whether queens of *S. invicta* are better able to usurp colonies to which their daughters have moved. For the second hypothesis, the researchers tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. The researchers observed aggressive behavior during these usurpation attempts to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.

* Red colored, underlined strings of text indicate that they have been taken verbatim from the original paragraph.

* Blue highlighted text indicates that it has been appropriated from the original paragraph with a change in the order of the words or phrases.

ORIGINAL PARAGRAPH

*“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”*

REWRITTEN VERSION 2

An investigation was carried out to examine whether workers of *S. invicta* can assist their mothers in colony usurpations. The first hypothesis tested was whether queens of *S. invicta* are better able to usurp colonies to which their daughters have moved. The second hypothesis tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressiveness during these usurpation attempts was measured to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.

Please indicate whether the above paragraph is:

1. Properly paraphrased.
2. Definitely plagiarized.
3. Cannot determine.

FEEDBACK: The author has not truly paraphrased the original paragraph. As with the first rewritten version, only a few words have been substituted, deleted, or added, leaving the rest of the sentences in the new paragraph virtually unchanged. Once again, too many of the phrases that make up the original paragraph are reproduced in the rewritten version. The author has simply failed to modify the original material sufficiently. For these reasons, the current rewritten version is considered an instance of definite plagiarism.

ORIGINAL VERSION

“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”

PLAGIARIZED VERSION

An investigation was carried out to examine whether workers of *S. invicta* can assist their mothers in colony usurpations. The first hypothesis tested was whether queens of *S. invicta* are better able to usurp colonies to which their daughters have moved. The second hypothesis tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressiveness during these usurpation attempts was measured to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation

* Red colored, underlined strings of text indicate that they have been taken verbatim from the original paragraph.

- * Blue highlighted text indicates that it has been appropriated from the original paragraph with a change in the order of the words or phrases.

ORIGINAL PARAGRAPH

*“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”*

REWRITTEN VERSION 3

To determine whether workers of *S. invicta* can assist their mothers in colony usurpations, two researchers have conducted a study in which the following hypotheses were tested: First, they wanted to see whether queens of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, they tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. The ants' aggressive behavior during these usurpation attempts was observed to determine if the presence of related or familiar workers influenced the aggressive response toward either the resident queen or the queen attempting a colonytake-over.

Please indicate whether the above paragraph is:

1. Properly paraphrased.
2. Definitely plagiarized.
3. Cannot determine.

FEEDBACK: The first sentence of the rewritten version is probably an acceptable paraphrase of the first sentence in the original paragraph. However, with the exception of a minor transposition of words in the last sentence, the rest of the sentences have only been superficially changed by the addition or substitution of a few words at the beginning of each sentence. The remaining phrases in these sentences have not changed. As with the previous example, none of the sentences in the rewritten paragraph are totally identical to their counterparts in the original. Because there is still a significant amount of verbatim material taken from the original, the rewritten version would still be deemed as an example of plagiarism.

ORIGINAL VERSION

PLAGIARIZED

“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”

* Red colored, underlined strings of text indicate that they have

been taken verbatim from the original paragraph.

* Blue highlighted text indicates that it has been appropriated from the original paragraph with a change in the order of the words or phrases.

ORIGINAL PARAGRAPH

*“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”*

REWRITTEN VERSION 4

To determine whether workers of *S. invicta* can assist their mothers in colony usurpations, a study was conducted in which the following variables were investigated: First, *S. invicta* queens' hypothesized ability to usurp colonies to which their daughters have moved was examined. The second hypothesis tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. During these usurpation attempts aggressive behavior was observed to determine if the presence of familiar or related workers influenced aggression toward either the resident queen or the queen attempting colony usurpation.

Please indicate whether the above paragraph is:

1. Properly paraphrased.
2. Definitely plagiarized.
3. Cannot determine.

FEEDBACK: In this version the first two paraphrased sentences appear to have undergone moderate modifications. However, the second two sentences have not been adequately paraphrased. As with previous versions, the third sentence was changed by a mere substitution of the first two of three words and the fourth sentence has not been changed at all making these two sentences plagiarized versions of the original. Because the first two sentences were not sufficiently modified and because the last two sentences contain only minimal changes, this rewritten version of the original paragraph is still considered as a case of plagiarism.

ORIGINAL VERSION

“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”

PLAGIARIZED VERSION

To determine whether workers of *S. invicta* can assist their mothers in colony usurpations, a study was conducted in which the following variables were investigated: First, *S. invicta* queens' hypothesized ability to usurp colonies to which their daughters have moved was examined. The second hypothesis tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. During these usurpation attempts aggressive behavior was observed to determine if the presence of familiar or related workers influenced aggression toward either the resident queen or the queen attempting colony usurpation.

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* Blue highlighted text indicates that it has been appropriated from the original paragraph with a change in the order of the words or phrases.

ORIGINAL PARAGRAPH

*“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”*

REWRITTEN VERSION 5

An investigation was carried out to determine whether S. invicta mothers are helped by their worker offspring during colony usurpations. The study's focus of investigation was the question of whether colony take-over by S. invicta queens is more effective when their daughters first invade the colonies. One hypothesis concerned the extent to which daughters' familiarity with the queen, or their genetic similarity to her, affects successful colony take-over. During attempts at taking over another colony, behavioral observations were made of usurping workers that were either familiar or genetically related to the queens to see if these variables were related to aggressive behavior toward the resident or the invading queen.

Please indicate whether the above paragraph is:

1. Properly paraphrased.
2. Definitely plagiarized.
3. Cannot determine.

FEEDBACK: Although some of the terms from the original paragraph have been retained in the rewritten version, the current paraphrased version has been sufficiently modified from the original and is, therefore, classified as having been correctly paraphrased.

ORIGINAL VERSION

“This study examines whether workers of S. invicta are able to assist their mothers in colony usurpations. First we tested whether [queens] of S. invicta are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”

PLAGIARIZED VERSION

An investigation was carried out to determine whether S. invicta mothers are helped by their worker offspring during colony usurpations. The study's focus of investigation was the question of whether colony take-over by S. invicta queens is more effective when their daughters first invade the colonies. One hypothesis concerned the extent to which daughters' familiarity with the queen, or their genetic similarity to her, affects successful colony take-over. During attempts at taking over another colony, behavioral observations were made of usurping workers that were either familiar or genetically related to the queens to see if these variables were related to aggressive behavior toward the resident or the invading queen.

* Red colored, underlined strings of text indicate that they have been taken verbatim from the original paragraph.

* Blue highlighted text indicates that it has been appropriated from the original paragraph with a change in the order of the words or phrases.

ORIGINAL PARAGRAPH

*“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”*

REWRITTEN VERSION 6

Balas and Adams carried out an investigation to determine whether *S. invicta* mothers are helped by their worker offspring during colony take-overs. These authors asked whether colony take-over by *S. invicta* queens is more effective when their daughters first invade the colonies. A second hypothesis concerned the extent to which daughters' familiarity with the queen, or their genetic similarity to her, affects successful colony take-over.

During these occupation attempts, aggressive behavior of usurping workers that were either familiar or genetically related was observed to see if these variables mediated aggressive behavior toward the invading or the resident queen.

Please indicate whether the above paragraph is:

1. Properly paraphrased.
2. Definitely plagiarized.
3. Cannot determine.

FEEDBACK: If you selected “properly paraphrased”, you are correct. Although as in the earlier example (No. 5) the structure of the paragraph (i.e., order of the sentences) has been preserved, the present rewritten paragraph represents a thoroughly modified version of the original. The reader is reminded; however, that in some disciplines, particularly within the humanities, a proper paraphrase entails a change in the overall structure of the paragraph as well as a change in the wording. Given, that scientific writing is sometimes multidisciplinary in scope, authors should make every effort to be thoroughly acquainted with the rules of scholarship encompassing the readership of their work.

ORIGINAL VERSION

“This study examines whether workers of *S. invicta* are able to assist their mothers in colony usurpations. First we tested whether [queens] of *S. invicta* are better able to usurp colonies to which their daughters have moved. Second, we tested whether the effect of daughters on usurpation success is due to familiarity with the queen or to genetic relatedness. Aggressive behavior during these usurpation attempts was observed to determine if the presence of familiar or related workers influenced the aggressive response toward either the resident queen or the queen attempting usurpation.”

PLAGIARIZED VERSION

Balas and Adams carried out an investigation to determine whether *S. invicta* mothers are helped by their worker offspring during colony take-overs. These authors asked whether colony take-over by *S. invicta* queens is more effective when their daughters first invade the colonies. A second hypothesis concerned the extent to which daughters' familiarity with the queen, or their genetic similarity to her, affects successful colony take-over. During these occupation attempts, **aggressive behavior** of usurping workers that were either **familiar or** genetically related was observed to see if these variables mediated aggressive behavior toward the invading or the **resident queen**.

* Red colored, underlined strings of text indicate that they have been taken verbatim from the original paragraph.

* Blue highlighted text indicates that it has been appropriated from the original paragraph with a change in the order of the words or phrases.

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