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Editorial: Plagiarism: Words and Ideas

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The scientific community has made considerable progress in detecting plagiarism of published articles in recent years as a result of the deployment of computer programs that compare texts for similarity. Several years ago, publishing companies began using a plagiarism detection service known as CrossCheck, which searches article databases. The program used by CrossCheck flags articles for potential plagiarism, based on percentage of similarity of text. To determine whether plagiarism has occurred, the articles must be read by a human being, because the program cannot take the context of the writing into account. For example, two different articles might contain very similar methods sections, but this would not be plagiarism if the suspected section includes proper citations (Butler, 2010).

Taylor and Francis tested CrossCheck for six months on submissions to three science journals. In one journal, 23% of screened articles were rejected for plagiarism. The other journals had plagiarism rates of 6% and 10% of submitted manuscripts during the trial period. Since the managers of Taylor and Francis selected these three journals for testing because they had reported instances of plagiarism in the past, they expect that the plagiarism rate among submissions will be much lower in other journals. The CrossCheck database now includes 25.5 million articles from more than 48,517 journals and books provided by 83 publishers. These numbers will continue to grow as more publishers use the system and place articles in the database (Butler, 2010).

Although using CrossCheck to identify plagiarism of text will undoubtedly promote integrity in scientific publication, it does little to address plagiarism of ideas. Most definitions of plagiarism include misappropriation of words and ideas (Shamoo and Resnik, 2009). Ideas include thoughts that are not written down, including hypotheses, concepts, suggestions, and methods. The U.S. federal government's policy on misconduct defines plagiarism as "the appropriation of another person's ideas, processes, results, or words without giving appropriate credit" (Office of Science and Technology Policy, 2000). Dictionary.com (2012) defines plagiarism as "an act or instance of using or closely imitating the language and thoughts of another author without authorization and the representation of that author's work as one's own, as by not crediting the original author ..."

Plagiarism of ideas can be more difficult to prove than plagiarism of text, because one must produce evidence concerning the origination of the idea and its misappropriation by another. To prove plagiarism of text, one need only compare two documents. Evidence concerning the origination of an idea could include laboratory notebooks, grant applications, emails, and other forms of documentation. If the idea has been only communicated verbally and there is no textual evidence concerning its origination, then oral testimony—which can be unreliable—may be the only source of evidence. If the idea is communicated in a private conversation

between two people, then it may be impossible to determine the originator, since the dispute may come down to one person's testimony versus another's. Even if one has solid evidence that a particular person came up with an idea, the person who is accused of plagiarism could argue that he (or she) developed the idea independently, with no knowledge of the other person's thought processes. If the two parties are collaborating on a project, or one person is a teacher and the other is a student, the person who is accused of plagiarism could maintain that they both developed the idea together.

Because plagiarism of ideas can be difficult to prove, some scientists and research integrity officials may be reluctant to pursue allegations involving only plagiarism of ideas, and may focus their efforts on plagiarism of words. Plagiarism of ideas should not be ignored, however, because it is a serious concern that threatens the integrity of scientific research and the careers of young researchers. Many egregious instances of plagiarism have involved teachers stealing ideas from students. One of the most well-known cases involved Carolyn Phinney, who won a \$1.67 million lawsuit in 1997 against her former mentor, Marion Perlmutter, and the University of Michigan. Phinney developed an instrument to measure the psychological effects of human aging when she was a research assistant at the University of Michigan in 1988. Perlmutter was a gerontology professor who took an interest in Phinney's work and asked to incorporate it into a grant application. Perlmutter also offered Phinney a job and authorship on scientific papers. Perlmutter soon claimed the instrument as her own and refused to return Phinney's laboratory notebooks. Phinney pursued litigation after university officials failed to adequately address her complaints (Grossman, 1997).

The history of science unfortunately contains numerous examples of teachers taking ideas from students without giving them appropriate credit (Shamoo and Resnik, 2009). Robert Millikan won the Nobel Prize in Physics in 1923 for determining the charge of an electron. Millikan's results were based on a paper he published in the journal *Science* in 1910 reporting experiments involving the suspension of electrically charged oil drops in magnetic fields. Harvey Fletcher was a graduate student who was working with Millikan at the University of Chicago. Fletcher made numerous suggestions that were crucial for executing the oil drop experiment, including the idea that oil drops should be used instead of water drops, because water evaporates too quickly to obtain accurate measurements. Fletcher was not listed as an author on Millikan's famous paper, although he was listed as an author on other papers with Millikan. In recalling their relationship, Fletcher said that he was disappointed that he was not named as an author on the paper that led to the Nobel Prize, but he bore no bad feelings toward Millikan because Millikan helped him advance his scientific career (Fletcher, 1982).

Selman Waksman won the Nobel Prize in Medicine in 1952 for the discovery of streptomycin, an antibiotic used to treat tuberculosis and other diseases. In 1943, Albert Schatz isolated the drug from a strain of the bacteria *Streptomyces griseus*, which he found in farmyard soil. Schatz was a graduate student at the University of Rutgers and Waksman was his supervisor. Waksman worked with collaborators at the Mayo Clinic in Rochester, MN, to test the drug in pigs and then in humans. As news of their important discovery spread, Waksman began to take full credit for the discovery. He also reached an agreement with Rutgers that allowed him to receive thousands of dollars in royalties from the patent that he and Schatz were awarded, but Schatz received nothing. Schatz sued the University and Waksman, and the parties reached a settlement in 1950 that recognized Schatz as a co-discoverer of streptomycin and gave him a share of the royalties. Even though he had been recognized as co-discoverer of the drug, the Nobel committee awarded the prize only to Waksman. When Schatz protested this omission, the committee responded that he was merely a laboratory assistant and did not deserve recognition (Pringle, 2012).

Although mentors have been taking advantage of students for time immemorial, this does not make this practice ethical. Indeed, theft of ideas from a student (or other collaborator) is arguably much worse than inappropriate copying of text from a published paper. Once a paper is published, the author has achieved some recognition for his or her work. Others who copy the author's words are misrepresenting their own contributions to science, but they are usually not preventing the original author from obtaining credit. If an idea is misappropriated, however, the author may never achieve appropriate recognition, even if he or she fights for it. Plagiarism can be especially damaging to student victims, since they may become alienated from science if they feel they have been mistreated. Phinney, for example, said that she suffered from depression and emotional distress as a result of Perlmutter's actions. She left science and was unemployed for several years after the lawsuit was settled (Hilts, 1997).

Scientists should celebrate the advent of CrossCheck and other technologies that can deter plagiarism of words, but plagiarism of ideas remains an important concern that still needs to be addressed. To deal with this problem, policies adopted by research institutions, federal agencies, and publishers should stress that plagiarism may include misappropriation of words or ideas. Educational materials in responsible conduct of research should include discussions of plagiarism of ideas. Institutional officials that receive complaints about plagiarism of ideas should not dismiss these allegations as improvable claims unworthy of further investigation but should treat them as serious concerns that threaten the integrity of scientific research.

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