Copyright Law and Science

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April 17, 2023

the WINNOWER

SCIENCE AND SOCIETY

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DATE RECEIVED:
June 10, 2015

DOI:
10.15200/winn.143006.60713

ARCHIVED:
April 26, 2015

CITATION:
Anthony Salvagno, Copyright Law and Science, *The Winnower* 2:e143006.60713 , 2015 , DOI: 10.15200/winn.143006.60713

A few weeks ago I wrote a post about how using Creative Commons licensing can protect scientists while allowing use/reuse of scientific data and figures. Initially I wanted to find cases between scientists over copyright infringement or even misuse of the CC licenses. I quickly realized I needed a broad understanding of copyright law and decided to begin with that.

I now have a bunch of notes on the subject but am afraid to share those for fears of copyright infringement, but will happily summarize those notes and share my thoughts on how copyright can impact science and open science more specifically.

The basics of copyright

Copyright law is essentially very simple, and has been made increasingly simple since it was originally expanded upon in the US Constitution. The most recent addendum to this statute came about in the 1976 Copyright Act, which defined rights to copyright holders (exclusive rights), how copyright is achieved, and even what does/does not constitute infringement (fair use).

While the law is simple in principle, copyright infringement is not necessarily black and white. In some instances it is questionable as to what is even copyrightable. In others, the matter of fair use is debatable. Even when there is infringement, it can be tough to prove because there are varying degrees of copying or "borrowing."

To illustrate the simplicity of copyright law here is an outline of the basic principles:

1. Copyright is applied immediately from the moment any work is tangibly recorded, both publicly and privately.
2. To be protected a work needs to be original (not novel) and there needs to be a minimum element of creativity (known as expression).
3. There are several exclusive rights provided to copyright holders (scroll down to the infringement section) that include copying and distribution.
4. Copyright infringement is a federal offense!
5. Even though copyright is applied immediately, in order to file suit for infringement a copyright needs to be registered with the US Copyright Office.

If you want to know more about copyright continue reading on, but if you feel you understand the basics then skip ahead to my analysis of copyright application to science.

What is copyrightable?

The 1976 Act (as it will be referred) provides protection to "*original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived,*

reproduced, or otherwise communicated, either directly or with the aid of a machine or device." The important parts of that statement are works and authorship, meaning you, the author, need to independently (or jointly in some cases) and originally create something, the work, to be provided copyright protection.

When it comes to claiming a copyright it is important to note that copyright protection ONLY applies to copying, displaying, and derivations of the work. That is to say, it does not apply if another author independently creates an identical piece of work. I'll explain a little more on this later, but if for instance two authors simultaneously create an identical work independent of each other, they are both granted copyright and there would be no case for infringement between the two.

The Act, particularly the statement above, also defines the moment of protection, which is immediate as soon as the work is fixed tangibly. For instance if you are writing a book, the work is copyrighted as soon as you write it down, even before it hits publication. For less tangible creative works (choreography for instance) the work is fixed as soon as it is tangibly recorded. A musical piece would be copyrighted after it is recorded, or sheet music is produced.

When determining copyright there are two important aspects: originality (which I mentioned above) and expression.

Article b of section 102 (of the 1976 Act) states, *"In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work.*" Essentially, any work based on fact is not copyrightable. Because of this, expression is important because there needs to be some minimum amount of creativity involved in authorship. The challenge with copyright lies in what exactly the minimum amount is.

The other important factor in determining copyright lies in originality. Surprisingly a work doesn't need to be novel, it just needs to be original or proved that it wasn't copied or derived from another author. This is to separate copyrights from patents where (which I know next to nothing about) novelty plays a major role, and is also where ideas, methods, etc are granted protection. Because of the concept of originality, copyright applies almost exclusively to creative works, but anything can be copyrighted as long as there is some aspect of creative expression involved.

Copyright violations

Section 106 of the 1976 Act defines the exclusive rights of the copyright holder, which protect the owner from infringement. Those rights include protection against (paraphrasing):

- reproduction
- distribution
- derivation
- performance
- display

Basically the copyright holder (or owner) has the exclusive right to exploit those uses and infringement occurs when those rights are violated without the author's consent. It should be noted that those rights will all be upheld publicly, but the right to reproduce and derive are upheld in private cases as well.

It is here that fair use plays a role in copyright infringement and, in my opinion, complicates everything. Fair use comes into play when other interests should override the rights of the owner. There are 4 main interests when deciding fair use:

1. purpose and character of the use, including commercial uses
2. the nature of the copyrighted work
3. the proportion of the work that was used
4. the economic impact of the use

Economic impact is almost always the deciding factor when determining fair use. Generally having a non-profit use and being educational in principle can greatly help a fair use defense, but that's not always the case. To go along with that, if a potential violation is in the same economic area of use there is probably no fair use even if it is educational, private, and non-profit. For instance if an author writes an informational book (for educational purposes) and copies of the book are distributed (for free) for educational purposes, there will be infringement since the educational use is in direct competition with the originally intended purpose.

Infringement occurs when any of the exclusive rights are violated. Note that an owner can file for an infringement law suit ONLY if the copyright holder has registered the copyrighted work. Posting notice of copyright is optional in infringement suits, but generally helps your case. As a copyright holder you don't need to file immediately, as you are allowed to file for registration after finding an infringement but before filing suit.

It is especially important to realize that infringement doesn't need to be intentional or direct, and a lot of cases involve indirect infringement. This can be of several forms:

- Unconscious infringement happens when an author unintentionally and inadvertently borrows from another work.
- Indirect infringement occurs when one person knowingly and actively encourages another to copy/infringe. This is analogous to being an accessory in criminal law.
- Contributory infringement is creating something that can be used to infringe on copyrights. But if there are substantial non-infringing uses, there probably won't be contributory infringement. An example of this is Napster, which was found guilty of contributory infringement (A&M Records v Napster, 2001). Sony was in a similar law suit when they produced the Betamax recorder, but because there were non-infringing uses they were not found guilty (Universal City Studios, Inc v Sony Corp of America, 1979).
- Vicarious/related infringement is similar to indirect infringement but is slightly more indirect. In this case you are infringing if you are in a position to profit from an infringing performance AND if you are in a position to control/supervise the performance. I'm sure it is usable in circumstances other than performance, but this is how it was presented to me.

The most difficult aspect of infringement is proving infringement occurred. To do this you must show you are the copyright holder and prove copying (or other infringement). And in determining copying you usually need to show (1) the violator had access to the original work and (2) that there is substantial similarity to the original work. Of course this is not always necessary, but can significantly help a case.

The application of copyright to science

So how does all of this apply to science? Well for the most part I believe it doesn't! Since most of science is fact based and process driven patents are designed to take care of this. While there are no statutes against having dual protection in the form of patents and copyrights, it is not likely to receive copyright protection if there is patent protection since the copyright lasts much longer than the patent. But that's not to say none of science is copyrightable.

In fact as we all know (thanks publishers!) that journal articles are in fact copyrighted. Or so it seems. It can be interpreted that there is creative expression in organizing scientific discoveries (which are fact based) and that would make them copyrightable. Journals hold the copyrights for publications and have exclusive right to copy and distribute the articles any any material contained within. And I've recently learned of cases where they've tried to enforce it.

In that link, the author tries to distribute (via publishing in her blog) figures from a publication and receives a cease and desist letter. Unfortunately we'll never know if that is a violation because the infringement never went to trial. She made an argument for fair use, which probably has some grounds, but skirted around the issue by recreating the figures using the original data (which is NOT copyrightable), thus making her own figures original and thus copyrightable.

There is a chance that she has no fair use argument since her reuse (even through attribution) is a clear violation of distribution rights and can be viewed as falling within the same scope of the original publication. Even more intriguing to me is whether the information contained within the article is copyrightable in the first place since all the material produced in scientific publications are derived from non-copyrightable sources.

For the past week I've self-debated the copyrightable nature of science. Clearly, methods and protocols are not copyrightable, but instead can be offered patent protection. The aspects of science that theoretically can be copyrighted are publications and figures. Scientists would argue that the production of figures is highly creative since a data set can be analyzed in multiple ways and thus open to creative interpretation. I can also see an argument for publications that describe science to a broad audience since the explanation is highly creative.

Despite that, I see a lot of gray area when reporting scientific information directly from the experiment and results. There is very minor creative effort in that endeavor because I see the journal article as a translation of the data. The creativity comes in the creation of the introduction and the conclusion. Perhaps only those sections are copyrightable, and not the reporting aspect of the paper.

When it comes to copyright protection, no protection is afforded to works of utilitarian use, ie functional items. Interestingly some computer software is NOT copyrightable even though they are not excluded from protection. To clarify, functional components of software (ie some user interfaces) are not protected, as an example, when they are no longer the expression of an idea but instead the idea itself. The desktop aspect of most computer operating systems falls in this regime (Apple Computer Inc v Microsoft Corp, 1994).

It is because of this I feel that science isn't copyrightable. Don't take that to mean that it isn't because right now it is. I've just not read about any potential infringements that have gone to trial and been declared an infringement. I have read several cases that have similar situations that have been ruled both for and against copyright, and that can't be discounted either.

So for the moment science is granted copyright protection. As such let's operate under the assumption that it will continue to be.

With regards to traditional science, scientists are protected from the moment they record their data and create graphs of that data. They are even protected at conferences where they present their research. This is specifically useful in the case of scientific scooping, which isn't as rampant as we make it out to be but is still a major fear in the community. If you are the victim of copyright infringement, you have the right to file suit (once you apply for copyright). If you can prove there was access to your research findings and there is substantial copying you may even win your case.

If you are an open scientist (like myself), in that you publish your research findings online before peer-reviewed publication, you may be in an even better position. You are granted the same rights as a traditional scientist. In the open case, however, the proof of access is much easier to prove since a simple Google search can turn up your findings. The burden is then that you prove there is evidence of copying, which is hard enough as it is.

The only challenge with all this in general is once there is data analysis. Based on my reading, I'm willing to bet that data is not copyrightable, but the analysis should be because of the creative effort involved. So if someone scoops your data, you won't have a case for infringement, but if they scoop a figure, then there is grounds for infringement. This is not applicable in the case where there is data theft and an identical figure is created from that data.

Because of all the possible interpretations of copyright application to science, I highly advocate the use of the Creative Commons licenses. The CC0 (public domain), CC-BY (use with attribution), and CC-BY-SA (use with attribution and share alike) afford the copyright owner the ability to share their research findings with the community and in turn allow the community to share, use, and reuse those

findings without fear of retaliation. The most important aspect of these licenses is that (except for CC0) you still retain the right to take legal action should the terms of your copyright be violated (no attribution most likely).

The licenses allow others to use information and data without worrying about moral ambiguities, and in turn promote a culture of sharing and attribution. With the CC licenses there will be more social pressure to do the right thing instead of worrying about legal action. And when credibility is involved social pressure can work wonders.

My personal belief is that scientific information should be shared freely, especially when it comes to publicly funded science. Using the Creative Commons licenses provides the mechanism to share research freely, while also affording scientists the protection necessary for their “creative” endeavors. It is incredibly important to note that using the CC licenses (with the exception of the CC0) does NOT waive all your exclusive rights as a copyright holder. They allow you to waive your rights as long as the user of your work attributes, shares, etc (per terms of the license) in turn. If those stipulations are infringed, you are free to take action.

After my original article on all this (link up top), I still feel that open science leaves you better protected from copyright infringement, if you choose not to apply a CC license. If you do decide to go the CC route, you are essentially ridding yourself the headache of finding infringements and prosecuting, enhancing the speed of science, and overall making the world a better place.

Sources

Most of the information in this article came from:

Arthur Miller and Michael Davis. Intellectual Property: Patents, Trademarks, and Copyright in a Nutshell (4th Edition). St. Paul, MN: Thomson/West, 2007.

Cases:

- A&M Records, Inc v Napster, Inc, 239 F.3d 1004 (9th Cir 2001), 347
- Universal City Studios, Inc v Sony Corp of America, 480 F.Supp. 429(C.D.Cal.1979), reversed 659 F.2d 963 (9th Cir. 1981), 346, 364
- Apple Computer Inc v Microsoft Corp, 35 F.3d 1435 (9th Cir.1994), cert. denied 513 US 1184, 115 S. Ct. 1234, 75 L.Ed.2d 1129 (1995), 317

Other sources include Wikipedia (for US Constitution reference) and the Cornell Law library for links to the 1976 Act. That same information can be found at the US Copyright Office website.

It should be noted that I have a ton of notes from the book, and direct publication of those notes would most likely be a copyright infringement (even if there are grounds for fair use). But if you are interested in all the intricacies that I have discovered I would be happy to share those with you privately on the condition that the notes remain private and for your own personal use.