

DISCURSIVE ARTICLE

Legal and ethical considerations around the use of existing illustrations to generate new illustrations in the anatomical sciences

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Abstract

It is likely existing anatomical illustrations are often used as the basis for new illustrative works, given not all illustrators have access to human tissues, bodies, or dissections on which to base their illustrations. Potential issues arise with this practice in the realms of copyright infringement and plagiarism when authors are seeking to publish, a matter becoming more prevalent with the proliferation in publishing platforms and the increased adoption of generative artificial intelligence applications within academia. However, there is little published guidance that might inform authors when using an existing illustration as the basis for new work. This article provides information pertaining to copyright, copyright infringement, fair use and fair dealings, plagiarism, and the overlap of copyright and plagiarism to highlight issues of law and ethics that are relevant to the creation of illustrations. Interestingly, the determination of exactly what constitutes an “original” illustration per construction from a secondary source has not been determined in case law for anatomy illustrations. This fact illuminates the absence of a “bright-line” test for illustration reproduction and the difficulties in the objective assessment of what constitutes a “nonoriginal” illustration. The term “substantively different” is useful for determining whether illustrations derived from secondary sources can be deemed original. This article delivers guidance on how to develop illustrations with reference to determining whether copyright has been breached or plagiarism has occurred. It also provides information that will direct decision-making around illustrative content.

KEYWORDS

anatomy, copying, copyright, ethics, illustration, images, medical illustrator, plagiarism, publishing, visual plagiarism

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INTRODUCTION

An increase in the volume of publishing in the biomedical, medical, and anatomical sciences in recent decades¹ has been accompanied by a proliferation of copyright infringements² and ongoing concerns around plagiarized content.^{3,4} Copyright infringement (a legal issue) and ethical considerations such as plagiarism are recognized as an ongoing and contemporary concern in many fields, including areas such as photography,⁵ graphic design,⁶ architecture,⁷ interior design,^{8,9} and music,^{10,11} often because of the financial implications associated with content reproduction. These costs can arise through either legal action involving persons or groups that potentially violated copyright,¹¹ or the license fees associated with gaining permission to use material protected by copyright. The use of generative artificial intelligence (AI) has also raised the profile of both copyright infringement and plagiarism in recent years,^{12,13} leading to further discussion around the unauthorized use and reproduction of content. In particular, arguments center on original content creators suggesting AI engines should be paying authors for the use of their creations in generating new material.¹⁴

Artworks, including illustrations, are protected by copyright law¹⁵ and international conventions.¹⁶ Despite the inherent protections for artists and illustrators, it is difficult to find detailed information that assists authors and illustrators in understanding *what* copyright infringement and plagiarism are, particularly when it comes to visualizations and illustrations. Such guidance is necessary as existing illustrations are often utilized as inspiration for creating new images.^{17,18} This is especially relevant in the anatomical sciences given the common features of the human form, the plethora of images from about 600 years of scientific anatomical visualizations,^{19,20} and the increasing volume of additional new anatomical illustrations becoming available in print and digital formats. Further, many persons generating medical illustrations may not have access to body donors or dissections and must rely on others' depictions for reference.

This article aims to provide guidance by presenting an overview of the issues central to the determination of copyright infringement and plagiarism with respect to anatomical illustrations. That is, it illuminates issues of law which underpin copyright infringement, as well as discusses plagiarism which is determined around ethical standards. It outlines the technicalities around copyright infringement and visual plagiarism to aid an understanding of legal and ethical practice in creating and publishing anatomical illustrations, while also illuminating other ethical concerns relevant to the generation of these items. Its purpose is to enable and encourage transparent practice in the publishing community and among the creators of images, and to facilitate discussions around standards that can be used in conversations concerning the adoption of new technologies and their role in developing anatomical illustrations.^{21,22}

Copyright and illustrations

Copyright is a concept established in the seventeenth century,^{23,24} and while generally long-lasting, it can expire. In the United States, this duration is the creator's lifetime plus 70 years,²⁵ whereas the Berne Convention sets the minimum at life +50 years,¹⁶ indicating differences around expiry of copyright may exist between countries. However, all images created in the United States after 1978 and not in the public domain should be considered covered by copyright, and thus, the timing surrounding copyright should be assumed as long-lasting.²⁵ For older illustrations, this may mean they are no longer subject to copyright, and no legal infringement of copyright would take place if they were reproduced. Therefore, there would potentially be no *legal* consequence for reproducing the illustration as a facsimile or identical copy, though consideration around aspects relating to plagiarism would still exist. The responsibility for determining whether an illustration is protected under copyright falls with those who are looking to reproduce the original form. In relation to teaching contexts, specific exceptions to copyright law allow educators, within specified parameters, to reproduce works in the classroom setting.

Laws around copyright are globally ubiquitous, and across the world, they have similarities pertaining to the protection of copyright which originate from the establishment of the 1886 Berne Convention.¹⁶ Copyright laws allow the owner of the copyright to litigate against the use of an item or work that is copied or used without the express permission of the copyright owner, thus providing the owner to enforce exclusive rights over the use and reproduction of their work. It protects the *expression* of ideas, not the ideas themselves. For a work to be protected under copyright, it must meet criteria such as being an original work, a fixed expression, capable of identification, and having some permanent endurance (i.e., must endure and not be unduly impromptu or unrehearsed). This distinction is crucial in determining whether reproducing a work infringes on the copyright holder's rights. Illustrations are, by their permanent nature, creations covered by copyright.

Copyright is typically awarded to the person who creates or generates a work; however, the copyright holder may also be the employer of the person who generates the work if the work is created as a consequence of their role inside that organization (i.e., work for hire). It can also be transferred to another person or organization, such as when the copyright for the contents of an academic manuscript is transferred to the publisher. This transfer means that the publisher subsequently holds the copyright for the content of the published manuscript and can litigate against unauthorized reproduction of any part of this work, including illustrations.¹⁵

In many instances, illustrators who generate content for an academic publication may wish to own the copyright for the illustration they produce, and if they do so, they must negotiate with the publisher about retaining the copyright for the illustration(s) in question. In these cases, it will likely be noted in the illustration legend or within the illustration itself to whom the copyright belongs if it

is not the publisher. There are also circumstances where those who generate material do not have copyright placed upon their work, and the work is therefore able to be reproduced without legal consequence. An example of this is images published publicly by a U.S. federal agency, which exist in the public domain and can be freely used without copyright infringement.²⁶

Creative commons licenses and copyright

Another type of publication right that illustrators should remain aware of are Creative Commons (CC) licenses (see <https://creativecommons.org/share-your-work/cclicenses/>). The CC licenses fall within copyright law and can only be asserted by the copyright owner. They provide permission for material to be reproduced with certain conditions. In other words, CC licenses are a way in which permissions may be granted by the copyright holder (the licensor) to users of a work (the licensee) without the latter having to ask. There are presently six different kinds of CC licenses, all with different criteria around what is permissible in regard to content modification and distribution. All CC licenses allow copying of the work, with the stipulation that credit must be given to the content creator ("Attribution," for which "BY" is used as shorthand). Licensors may add other stipulations: noncommercial uses only, reuse only under the same license terms as the original, and nonderivative uses only. This last stipulation prohibits making something that is an adaptation of the original.²⁷ It is, therefore, still possible to infringe the copyright of CC licenses by reusing material in ways not allowed by the license. Those who seek to utilize CC-protected material need to be aware of the type of CC license covering the work.²⁸

Practice of industry or copyright holder

For works that are not licensed for reuse, obtaining written permission from the copyright holder is a recommended best practice before reproducing an illustration, as failing to do so may lead to legal action depending on the industry's practices and the copyright holder's attitude toward infringement. This may include a secondary publisher requiring documented evidence of permission from a copyright holder. When this permission is acquired, it should be noted in the illustration legend that permission to reproduce the illustration has been obtained, and copyright holders (such as publishing companies) may stipulate what exact words or phrases are to be used in the work that is attributing copyright. A common example of these requirements comes from a publisher in the anatomical sciences (Wiley Publishers) and is as follows:

If excerpts from copyrighted works owned by third parties are included, credit must be shown in the contribution. It is your responsibility to also obtain written permission for reproduction from the copyright owners. The corresponding author is responsible for

obtaining written permission to reproduce the material 'in print and other media' from the publisher of the original source, and for supplying Wiley with that permission upon submission.

The enforcement of legal redress for copyright infringement where permission from the copyright holder has not been acquired may depend on the practice of the industry of the copyright holder and is likely influenced by the attitude of the copyright holder to the nature of the infringement in question. A decision by a copyright holder to take legal action against copyright infringement could potentially be influenced by the purpose of the use, how much of the original illustration was used, the financial benefit to the user, and the influence on any "value" inherent in the original. It should also be noted that a copyright holder does not have to provide permission for an illustration to be used and may choose not to do so under any circumstances.

Fair use and fair dealings of material

Some uses of illustrative materials, including the replication of a whole or parts of an illustration, can be undertaken without necessarily having to approach a copyright holder for permission. Depending on the jurisdiction, this is deemed "fair use" or "fair dealing," terms which can be included in copyright law.²⁹ The broad purpose of these exceptions in law is to enable certain uses that are seen as desirable, such as research, criticism, review, news reporting, parody, or teaching and educational purposes. However, while these two concepts are similar, fair use is broadly more flexible, with court judgments in the United States developing the principle of "transformative use," that is, where a use for a work is different from the one intended by the creator, whereas fair dealing (the common term in many Commonwealth countries) is more prescriptive and, generally, does not incorporate the concept of transformative use. It is important to note that fair use in no way enables "free use." There are generally agreed factors weighed up by courts as to what constitutes a desirable use that does not unfairly impact the rights holder. In the context of illustrations, the key among these factors is the amount of the work copied, which, for an image, is typically the whole work, as distinct from a quotation of text, which may represent an insubstantial proportion of the whole work.

While statutes contain no "bright-line" rules (a defined distinction or standard that guides interpretation or resolution of any dispute, such as "100 words" or "10% difference between illustrations" in the case of illustrations) about what constitutes fair use or fair dealing, there are guidelines that have been developed to suggest what fair use and fair dealing do and do not include.^{30,31} It may include uses such as reporting within a news item, critique, review, or using the illustration for some purpose such as an art form or comparison.³² Commercial publishers usually have their own guidelines on when fair use is acceptable and when permission must be sought. It is also widely utilized in academic environments where original works are used as the basis for academic critique, discussion, or analysis.³¹ The

concepts can sometimes successfully be argued when the original artwork is used for the purpose of pastiche, homage, or parody, although the interpretation around this can invite legal challenge to determine whether the resulting use is, in fact, an infringement of copyright.^{33,34}

The fair use concept was not intended to allow reproduction of the illustration for a similar purpose to that which was originally intended, and guidelines around this distinction are clear.^{30,31} Illustrators need to be aware of the correct term (i.e., fair use or fair dealings) and parameters of use that apply to their own jurisdiction. It is worth noting that, depending on jurisdiction, fair use of images from such sources does not legally require attribution while fair dealing does specify that use be “accompanied by a sufficient acknowledgment”.³⁵

Breaching copyright in newly created illustrations

Anatomical illustrations are rarely the subject of copyright disputes in a court of law, either by breaching fair use customs or by outright breach of copyright. This is interesting because copies of anatomical images appearing across different publishers and publications have, historically, been quite common. Examples include the perpetuation of incorrect anatomy through copying of illustrations in subsequent versions of textbooks such as repeated illustrations where the least thoracic splanchnic nerve is not shown³⁶ or where cranial nerves are misidentified.³⁷

Other forms of illustration have been scrutinized in court proceedings, including the generation of illustrations from photographs.³⁸ Examining multiple cases, Arnold³⁸ explored considerations around whether the generated illustrations breached copyright and found that perspectives about whether they did or did not breach copyright differed between jurisdictions. Common factors were the application of the degree of similarity, the nature of the reproduction (copy or modification), and the amount of skill required to generate the original photographs. In other case law focusing on illustrations, courts have noted that while copying requires a deliberate act, copyright infringement is determined by examining the similarities between the works and whether the infringing work is a disguised imitation of the original. The court further clarified that a “colorable imitation”—a work that appears original but is a reproduction of another's work—can constitute copyright infringement even if additional elements are introduced into the new work.³⁹

Cases from other artistic fields can provide guidance around potential copyright breaches for illustrations. In *Drynan v. Rostad (Canada)*, which centered on music content, the court evaluated whether the alleged infringing work had qualities that suggested it was a reproduction or adaptation of the original. In this case, for copyright infringement to be established, it was suggested two key elements must be present: (1) sufficient objective similarity between the infringing work and the original, and (2) a causal link proving that the infringing work was derived from the original.⁴⁰ This “causal link” was determined through the consideration of factors including

objective similarity, the probability that similarity is due to coincidence, and the quality of the subsequent work. The court ultimately ruled that both objective similarity and a causal connection were necessary to establish infringement.

Another case that is widely cited as guiding infringement of copyright, albeit for written work and from the nineteenth century, is *Folsom v. Marsh* from the United States, which helped determine what was required for a work to be original. The judge in the case provided illumination around their perspective:

The central purpose of this investigation is to see ... whether the new work merely ‘supersedes the objects’ of the original creation ... or instead adds something new, with a further purpose or different character, altering the first with new expression, meaning, or message; it asks, in other words, whether and to what extent the new work is ‘transformative’. (Judge Story in *Folsom v. Marsh*, 9. F.Cas. 342 (C.C.D. Mass. 1841)⁴¹)

Folsom v. Marsh highlights that any new work needs to be sufficiently transformative to be considered new and original. Care must be taken in considering this precedent when applying it to illustrations, noting it was a case focused on copyright and written work.

From the extant case law, it is therefore clear that there is no “bright-line” test for when copyright breach has occurred. It is suggested that, where it is apparent that another work is the basis for the secondary illustration, this is often likely to be interpreted as constituting a violation of copyright unless it can be clearly demonstrated to be used in a critique or in making an original contribution. A work should be substantively different, with original elements that make it not directly recognizable, to be argued as an original illustration that does not breach copyright. This is different to the application of the standard “sufficiently transformative,” a term which is generally applied to the use of the material where the purpose of the new work is different from the original. Therefore, the copyright of an illustration may be breached when a secondary illustration is deemed to be not substantively different from the original. That is, to the skilled observer, it is apparent that the original illustration has been used as the basis for the secondary item. Derivative illustrations need to be substantively different to avoid copyright infringement (Figure 1). In practice, this means copyright is violated if an original illustration is recolored, changed in orientation (e.g., “flipped” in the horizontal or vertical plane), placed into another image, traced, or used in part.

Plagiarism and visual plagiarism

Plagiarism is the copying or reproduction of material that was generated by someone or something else (i.e., AI) without attributing the creation of this material to the original source.⁴² It is an ethical construct that has no basis in law and, in this regard, is therefore distinctly different from copyright, which is a legal construct. Within the field of

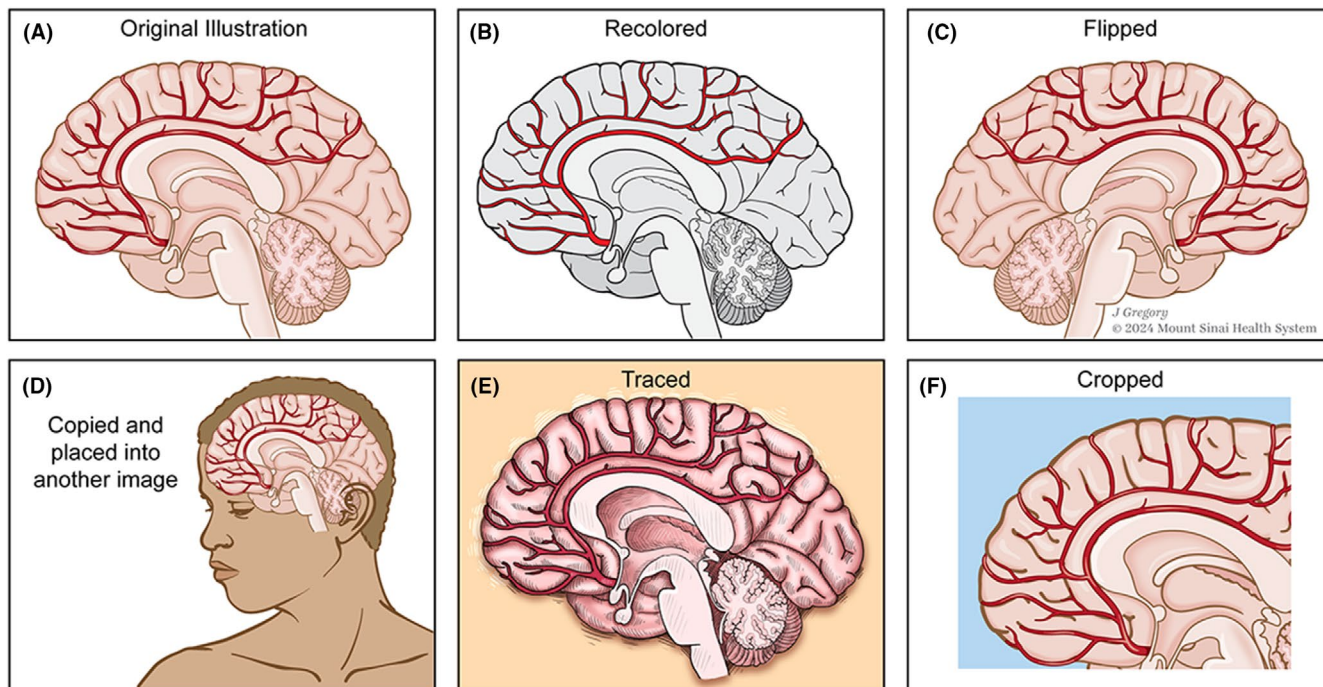


FIGURE 1 Illustration demonstrating inappropriate reproduction and therefore copyright infringement of an original illustration (A) in ways commonly observed in published literature. These include different reproduction forms such as the original work being recolored (B), being altered by flipping in the horizontal plane (C), placing the original into another image (D), reproducing the original by tracing (E), or by using part of the original illustration (F). Note that in each reproduction, the highly variable patterns of small gyri and sulci, and the minor branches of the anterior cerebral artery, are identical. This indicates reproductions (B–F) are not substantively different to (A). Used with permission from ©Mount Sinai Health System.

scientific publishing, instances of plagiarism are usually accompanied by censure or action by a professional body, institution, or association. When these instances occur in the sciences, they are often referred to as scientific misconduct. Visual plagiarism is the term used to signify illustrative content that is generated using another illustrative source without acknowledgment of or credit given to the original creator(s).

Publisher guidelines are generally explicit in their rules around not permitting plagiarized content to be knowingly published. Professional associations of editors,⁴³ illustrators,⁴⁴ and groups involved in highlighting publishing standards⁴⁵ also prohibit plagiarism to help uphold academic integrity. Detecting visual plagiarism can be difficult for the untrained observer,^{46–48} and identifying the original source of the plagiarized content can be problematic given the source may not be well known.⁴⁶ However, some experts can discern plagiarized artwork based on their knowledge of anatomical images and their sources. Currently, tools such as Google’s “reverse image search” can identify original image sources when presented with a derivative image. In the future, generative AI models could conceivably be trained to detect such visual plagiarism with more accuracy than current methods.⁴⁹

There are many terms used to describe content reproduced from another original illustration, including appropriation, tracing, copying, facsimile, reproducing, altering, and adapting. Some of these terms have distinct definitions. However, all have in common that for a derivative illustration *not* to be defined as plagiarism, it must acknowledge the original as the source of the generated illustration. Defining “what” constitutes visual plagiarism of illustrations is

difficult.⁵⁰ Cui et al.⁴⁶ used criteria based on the principal object (e.g., the leg if a leg is the focus of the illustration), minor object (such as an individual muscle, in the case of an illustration of a leg), layout, artistic style, color, theme, object category, and textual information to inform their study of illustrative plagiarism. Garrett and Robinson⁵¹ had study subjects mention how “different” an illustration needs to be in order to be “not plagiarized.” In practice, similar to copyright standards, there is no bright-line test for what is or is not considered visual plagiarism. However, it is prudent to suggest that copyright standards for assessing similarity are a useful basis for assessing reproductions to determine whether plagiarism has occurred.

The overlap of copyright and visual plagiarism

Visually plagiarized content is often accompanied by a breach of copyright, though this will depend on whether copyright exists in the content. The obvious consideration is whether copyright exists in an illustration and in what state the copyright resides (e.g., CC license). The original copyright may have expired in some instances, such as very old content. This means that copyright for this old content cannot be breached, although plagiarism can still occur because the original content was generated by another person. An example of this would be someone discovering an illustration from the late nineteenth century and reproducing it identically under the discoverer’s name. There would be no breach of copyright because any

“automatic right to copyright” has likely expired. However, the reproduction of someone else’s work without an acknowledgment of the original source remains plagiarism.

When sources or authors of illustrations cannot be identified—The orphan work

The term “orphan work” is used to describe copyrighted illustrative content where no illustrator or author can be identified, thus rendering inquiries around copyright impossible.⁵² This can occur when illustrations are posted or used on the internet with no attribution or source, and those accessing the illustrations are unable to trace the original use. Given orphan illustrative content likely has copyright attached (unless the copyright has expired because of time), any subsequent use of this material would, therefore, breach the author’s or publisher’s copyright. Any use of orphan illustrations to generate new works that were substantively similar to the original could, therefore, constitute a liability risk due to possible copyright infringement.

The U.S. Copyright Office⁵³ and similar agencies in other countries⁵⁴ have stated that remedies are required to address the burgeoning volume of orphan content, suggesting that denying users the right to use orphan content (on copyright grounds) stymies creativity by directing a large volume of resources away from their use. Solutions for dealing appropriately with orphan content include limiting the infringement remedies against a user of orphan content if they had undertaken a “good faith diligent search for the rights holder and completed certain notice and attribution requirements,” which is the current legal position in New Zealand.³⁵ Other means of solving issues around orphan works have been put forward, including changing the copyright system, introducing blockchain licensing that would allow control and licensing of downstream content use,⁵⁵ or use of digital watermarks to more easily identify the author or source. At present, the prudent solution to the issue of orphan content is to avoid its use in generating new illustrative content, given the issues with potential copyright infringement. It should also be noted that any derivative work of orphan content is potentially unable to avoid being labeled as plagiarism, given it cannot correctly be attributed.

Stock image websites, copyright, and plagiarism

Multiple websites exist that allow users to freely or cheaply access and download images and illustrations for use. Examples include Freepik (www.freepik.com), Pixabay (www.pixabay.com), and Unsplash (www.unsplash.com). These websites all have terms and conditions that outline to users’ information about illustration copyright and attribution. Sometimes, this can include freely licensed illustrations and no obligation to attribute content. While attribution may not be required as part of the terms and conditions of illustration use, this does not excuse users from not attributing the illustrations

if they seek to reproduce and publish them in peer-reviewed journals. Part of an author’s obligations to academic journal publishers during the publication process is to declare whether the content is original and, if it is not, to correctly and accurately attribute a source. Even though there may be no copyright infringements using illustrations acquired from these types of websites, failure to attribute the illustrations within scientific publications still constitutes an ethical violation of accepted publishing standards and is viewed as plagiarism.^{43,45}

“How to”: Guidance for using existing illustrations as the basis for creating new illustrations

For authors wishing to use illustrations where the resulting product is a clear reproduction of another illustration, publishing such work would constitute a violation of copyright should permission not be acquired from the copyright holder (see [Figure 2](#) for a flowchart of processes and considerations). In the example of an illustration prepared for the purposes of a peer-reviewed journal submission, it is the responsibility of the illustrator to communicate to the authorship team whether the illustration is derived from another source and to assist with acquiring permission from the copyright holder to produce a derivative of another work. This process will likely require obtaining permission in writing from the copyright holder indicated on the publication or illustration (if the copyright is held by the illustrator). If the original illustration is an orphan work, this presents additional difficulties in both determining what steps may address copyright within local jurisdictions and considerations around plagiarism should the original author not be able to be correctly attributed.

Once permission to reproduce the original is acquired, it is then necessary to correctly attribute the illustration to its original creator to avoid plagiarism. Good practice also includes stating that permission was acquired from the copyright holder to reproduce the work, and correct attribution will require the original publication to be cited in the bibliography of any resulting manuscript. If the resulting work is substantively different from the original source, no infringement of copyright will likely occur, and the illustration will not likely be viewed as plagiarism. Caution should be used in such circumstances as no definitive standard exists for determining precisely what “substantive difference” entails, and it is suggested that illustrators err on the side of caution, if doubt exists, and gain copyright holder permission and attribute the work appropriately.

DISCUSSION

Human anatomy is remarkable in its general consistency of form and structure between persons, and it would seem likely there already exists an illustration of specific anatomical details to suit most scientific purposes. There is some logic in the proposition that existing illustrations could be used as the basis for further illustrations. This

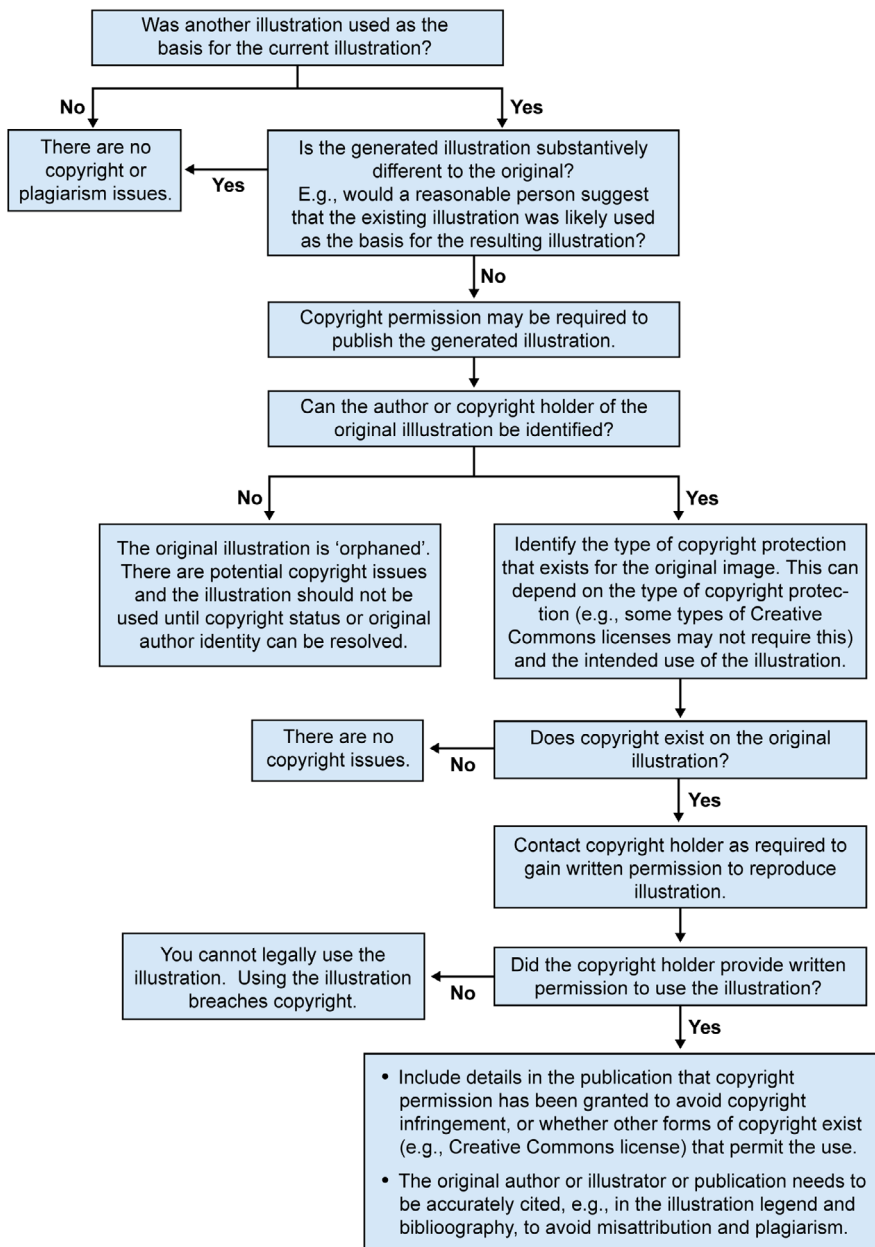


FIGURE 2 Flowchart to guide decision-making around copyright, permission to use illustrations to avoid copyright infringement, avoidance of plagiarism, and appropriate attribution for illustrations where fair use or fair dealings are not being claimed.

is likely one cause of the plagiarism observed among early medieval and renaissance anatomical illustrations that accompanied the development of reproductive printing methods of the era, including the unauthorized copies of images in Vesalius' *De humani corporis fabrica*.^{19,20,56} The modern perspective on copying or reproducing illustrations that someone else owns or creates is that these practices are both illegal²⁵ and unethical.^{43,44} The lack of case law to provide explicit guidance, the absence of a “bright-line” test for what is or is not a copied or derivative work, and the inherent difficulty in illuminating decisions around copying that will be broadly subjective in nature do not excuse the publishing and authorship community from refining standards around the interpretation of derivative works to guide future practice.

The topics of copyright infringement and visual plagiarism are of interest to those involved in the anatomical and health sciences for several reasons, including the integrity of the scientific publishing industry and academia in general. Early illustrators and artists, such as Max Brödel, have argued for the importance of creators of work to maintain control of the subsequent use of their work.^{57,58} The application of consistent standards and approaches to the reproduction of illustrations, including publisher management of this field,⁵⁹ is important for the maintenance of academic standards and ethical mores in the publishing community. Dissemination of “good practices” and clear indications of “what” copyright infringement and plagiarism entail around the reproduction of illustrations are required on a cyclic basis to assist authors and allow standards to be iteratively revised.

This practice would also aid contemporary decision-making around illustration generation as the increased use of visual platforms and the proliferation of journals and publishing mechanisms mean there is a risk that standards around the reproduction of illustrations will not be well known or communicated within an increasing pool of authors. The dissemination of “good practices” needs to include the publication of articles such as this current work that seeks to explain the concepts surrounding copyright and plagiarism, and educational initiatives to aid students and emerging authors in their understanding of what good practice entails.^{60,61}

Importantly, authoritative bodies with perspectives on the reproduction of illustrations should also deliver information about the ethical use of images in the anatomical sciences⁶²⁻⁶⁴ and the impact of the history of anatomy on copyright infringement and plagiarism. This includes explanations about why this topic is important, with reference to the copying of famous illustrations. A notable is illustrations from the Pernkopf atlas, from the National Socialist (Nazi) era and World War II, where victims of the Nazi regime were executed, dissected, and used as subjects for anatomical illustrations.⁶⁵⁻⁶⁷ Copies of these images were created for the postwar editions of the Sobotta atlas as late as 2019, in a practice that has only recently been openly addressed in a new introduction to the Sobotta.⁶⁸ In this case, the original publisher of both atlases was Urban and Schwarzenberg; however, now Elsevier holds the copyright for both works and is the publisher of the Sobotta atlas. Thus, because Elsevier owns the copyright and is the publisher of both the Pernkopf originals and Sobotta reproductions, there was no infringement of copyright and no legal transgression. However, the practice of copying or tracing the Pernkopf originals without disclosure of source or warning for the reader is considered highly questionable, given the active debate around the Pernkopf atlas.⁶⁹

Illustrations and a potential future using generative artificial intelligence

The recent explosion of generative AI platforms and their accessibility has impacted many aspects of society, whereby creation of material once reserved within the domain of literary and visual artists is now possible with an internet connection.⁷⁰ Recent controversies around the generation of artistic works include the Screen Actors Guild—American Federation of Television and Radio Artists strike in the United States where a key focus was around the use of AI within the industry.⁷¹ Generative AI applications are already utilized for creating illustrations (e.g., OpenArt, www.openart.ai; Canva, www.canva.com), and recent attempts to use them to evaluate creativity in drawings have been encouraging,⁷² suggesting such tools could be utilized for both the future production and identification of generative AI content. However, for the purposes of preparing anatomical illustrations their accuracy is currently poor.^{21,22}

Ongoing use of generative AI to produce illustrative content poses interesting questions, including whether such content will be covered by copyright. Currently, copyright is not awarded to

illustrations generated through automated processes where the author is not human.⁷³ This position is under considerable scrutiny in courts as definitions surrounding how much and what sort of human input is required to establish a threshold allowing copyright to be awarded.⁷⁴ This has implications for the scientific publishing community who would need to explore how publishing of AI-generated illustrations would impact processing and publishing frameworks with regard to copyright.

There are additional considerations that the anatomy profession will need to proactively address as the use of generative AI to create illustrations proliferates. These include how to determine whether AI illustrations are of an adequate standard and fit for purpose, and whether the generation of such illustration is ethical in regard to subject matter (i.e., where training data are sourced, and whether this is ethical) and illustration utility (e.g., how professions such as medical illustrators are impacted or involved in illustrative processes or applications).²¹ Identifying an appropriate balance between innovation and ethical integrity will be necessary in ensuring generative AI benefits anatomists and other stakeholders while these issues are addressed.

Future-facing: Responsibilities of publishers and the academic community

In an environment where rates of publishing are substantially increasing,¹ it is naïve to believe there will not be a concomitant increase in rates of copyright infringement and plagiarism in academic publishing. Future-facing initiatives, tied to appropriate aims and objectives around standards of academic publishing, are crucial for maintaining and improving publishing standards in the medical sciences. Initiatives to increase awareness around contemporary standards will assist in building a community of practice and promoting awareness and adherence to legal and ethical standards. Resourcing educational communications and events such as workshops, webinars, and collaborative events focused on the appropriate use of illustrations would assist researchers, educators, and students in developing the knowledge to identify and navigate copyright and plagiarism issues responsibly.

Information or instruction to authors and illustrators on signifying copyright infringement and plagiarism around illustrations, and how best to effectively communicate this information effectively between interested parties, is currently opaque or not readily discoverable. Resources exist to guide readers, reviewers, and editors when plagiarism is suspected,^{75,76} including when potential image manipulation is identified.⁷⁷ Processes from the identification of visual plagiarism, including actions and consequences, are outlined in the COPE guidelines and include notifying the editor in chief of the journal where the offending image is located. Other options are available to readers who identify illustrative content that may be suspicious, including directly contacting the publishing journal (for an example of process, see <https://www.wiley.com/en-us/network/publishing/research-publishing/research-integrity>). If it is

the reader's own work that has been reproduced without copyright permission or attribution, they could consider notifying the editor in chief of the journal in which they originally published in as this journal may own the copyright and therefore have a legal interest in pursuing an outcome.

Despite the existence of resources such as the COPE guidelines, no detailed instructions exist to guide authors and illustrators in making decisions around derivative illustrative content. Resources should include clear instructions and documentation that guide authors and illustrators on how to respond when they identify potential copyright infringement or plagiarism around illustrations. Similarly, clear documentation is needed regarding the actions publishers will take if copyright infringement or plagiarism is identified. Active engagement of publishers with the author and illustrator community to develop or implement resources will be useful, in addition to publishers taking appropriate legal and ethical action where infringement is identified. Companies with ownership of large databases of images trawl the internet for posted images to identify copyright infringement and serve "cease and desist" notices, which are commonly accompanied by requests for payment.⁵⁰ The application of similar standards by the publishing industry, regardless of the publishing platform, will aid in providing clarity and reducing confusion about what is and is not good practice. This will assist in developing and maintaining an informed, educated community of practice and give confidence that the existing standards are being appropriately enforced. Increased clarity will help ensure that anatomical illustrations are both generated and used appropriately, thereby supporting integrity in academic publishing.

Limitations of this exploration

This article is not intended as legal advice regarding the determination of copyright around medical illustrations. Rather, its purpose is to illuminate the finer points surrounding the use and reproduction of these images and the considerations that are required when a medical image or illustration is reproduced or used as the basis for subsequent artwork or illustration. It does not address the issue of Indigenous perspectives around intellectual property and ownership, a field that will likely continue to develop and influence discussion about copyright. The topic of Indigenous contribution and engagement with illustrative works will need to be addressed and considered for future anatomical illustrations where Indigenous content is created, developed, or utilized to ensure respectful and authentic outcomes that are community-supported and appropriate for all users and generators of illustrative content.

CONCLUSIONS

The identification, illumination, and implementation of best practices around the publication of medical illustrations are becoming

more urgent. This is due to the rapid proliferation of images coupled with the application of generative AI and machine learning algorithms that allow for rapid modifications and changes to existing digital catalogs. This article looks to raise awareness around aspects of good practice regarding the publication of illustrations, providing guidance to maintain and promote legal and ethical standards in the academic and publishing communities. Copyright and plagiarism are important concepts for authors and illustrators to understand, regardless of their experience in publishing or presenting material. The application of these concepts to illustrations is no exception, and the proliferation of publishing opportunities demands that literature illuminating good practice is circulated on a regular basis to remind and educate the academic community of its collective responsibility. While there are difficulties in determining precisely what is or is not copyright infringement and plagiarism with respect to illustrations, there are commonalities in the determination of both, which suggest that a reproduction should be substantively different to be defined as an original illustration. While some criteria and computer programs exist to help evaluate and determine substantive differences between two or more illustrations, more tangible use cases comparing images would be beneficial for the field to guide such determinations.

AUTHOR CONTRIBUTIONS

Jon Cornwall: Conceptualization; project administration; visualization; writing – original draft; writing – review and editing. **Richard White:** Writing – original draft; writing – review and editing. **Patrick Pennefather:** Writing – original draft; writing – review and editing. **Sabine Hildebrandt:** Writing – original draft; writing – review and editing. **Jill Gregory:** Writing – original draft; writing – review and editing; visualization. **Heather F. Smith:** Writing – original draft; writing – review and editing. **Jason Organ:** Writing – original draft; writing – review and editing. **Claudia Krebs:** Conceptualization; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare they have no conflicts of interest.

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