

# PITFALLS OF OPEN LICENSING: AN ANALYSIS OF CREATIVE COMMONS LICENSING

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## ABSTRACT

The explosive growth of Creative Commons licenses, an innovative set of legal tools that facilitate the open licensing of copyrighted works, is one of the most significant recent phenomena related to the production and distribution of culture. More than fifty million web pages currently link to Creative Commons licenses, and usage of these licenses continues to increase rapidly. This Article analyzes the legal implications of Creative Commons licenses, both statically—as applied to a single copyrighted work—and dynamically—as the rights and restrictions these licenses grant and impose on today’s works shape the production and distribution of future works. By modeling the effects of particular Creative Commons licenses, the Article offers an understanding of how these increasingly popular legal tools may shape our cultural environment, particularly with respect to digital works. It concludes, among other things, that incompatibilities between certain Creative Commons licenses may limit the future production and distribution of creative works in ways that today’s creators may not intend.

## I. INTRODUCTION

In its brief existence, Creative Commons (CC) has become a major player shaping the production and distribution of creative works. A nonprofit organization founded by Larry Lessig and others in 2001, CC began with a simple goal: to offer free licenses that creators of written, audio, and video content could use to facilitate large-scale sharing of their copyrighted works.

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By attaching a CC license to her work—typically by linking from a web page that offers the work to a CC web page containing the license text—a content creator can authorize anyone who comes in contact with the work to use it in ways that would otherwise be prohibited by copyright law, for example copying or distributing the work. As CC’s mission statement explains, “We work to offer creators a best-of-both-worlds way to protect their works while encouraging certain uses of them—to declare ‘some rights reserved.’”<sup>1</sup>

CC’s robust and easy-to-use legal tools have been hugely popular. As of August 2005, more than fifty million web pages linked to CC licenses, the first of which was released less than three years before.<sup>2</sup> Publications such as the *Duke Law Journal*, *Harvard Journal of Law and Technology*, and *Michigan Law Review* have published content under CC licenses and adopted CC’s Open Access Law Journal Principles.<sup>3</sup> Google now enables users to search the Internet for CC-licensed works,<sup>4</sup> as do Yahoo!<sup>5</sup> and StreamCast.<sup>6</sup>

A burgeoning array of license types has enabled this explosion of CC-licensed works. There are currently more than a dozen licenses and other offerings available from CC. CC’s success, and the increasing variety of CC licenses in existence, suggests a need to subject these licenses and licensing practices to analysis, much as open source (or “free”) software licenses have been studied.<sup>7</sup> Yet although CC licensees are beginning to attract scholarly attention,<sup>8</sup> little has been written to date.

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<sup>1</sup> Creative Commons, *Creative Commons*, <http://creativecommons.org/about/history> (accessed Feb. 6, 2006).

<sup>2</sup> Mike Linksvayer, *Creative Commons, 53 Million Pages Licensed*, <http://creativecommons.org/weblog/entry/5579> (accessed Nov. 25, 2005).

<sup>3</sup> E.g. Nina A. Mendelson, *Chevron and Preemption*, 102 Mich. L. Rev. 737, 737 (2004); Michigan Law Review, *Open Access Policy*, <http://students.law.umich.edu/mlr/openaccess.html> (accessed Feb. 6, 2006).

<sup>4</sup> Google, *Google Advanced Search*, [http://www.google.com/advanced\\_search](http://www.google.com/advanced_search) (accessed Feb. 6, 2006).

<sup>5</sup> Yahoo!, *Yahoo! Search, Creative Commons Search Beta*, <http://search.yahoo.com/cc> (accessed Feb. 6, 2006).

<sup>6</sup> See *MGM v. Grokster*, 125 S. Ct. 2764, 2790 (2005) (Breyer, J., concurring); see also Macband.com, <http://macband.com> (accessed Feb. 6, 2006) (online directory of songs and music loops released under CC licenses).

<sup>7</sup> See e.g. Robert W. Gomulkiewicz, *De-Bugging Open Source Software Licensing*, 64 U. Pitt. L. Rev. 75, 75-76 (2002); Josh Lerner & Jean Tirole, *The Scope of Open Source Licensing*, 21 J. L. Econ. & Org. 20, 20 (2005); Michael J. Madison, *Reconstructing the Software License*, 35 Loy. U. Chi. L.J. 275, 275, 277 (2003); David McGowan, *Intellectual Property Challenges in the Next Century: Legal Implications of Open-Source Software*, 2001 U. Ill. L. Rev. 241, 242 (2001).

<sup>8</sup> See Niva Elkin-Koren, *What Contracts Cannot Do: The Limits of Private Ordering in Facilitating a Creative Commons*, 74 Fordham L. Rev. 375 (2005).

As CC licenses proliferate, two issues merit particular attention. First, the increasing variety of CC licenses may give rise to user confusion as licensors struggle to determine which license is best suited to their needs and licensees fail to understand the precise rights and obligations that attach to a licensed work. The transaction costs resulting from these uncertainties affect the open source software community<sup>9</sup> and are potentially substantial obstacles to broader and more rapid adoption of CC licenses.<sup>10</sup>

License proliferation also raises a second concern. In at least two instances, CC licenses have led to incompatibility problems, where conflicting license provisions inhibited the creation of new works, contrary to the apparent wishes of the creators of the original works.<sup>11</sup> Based on the results of a static—as applied to a single copyrighted work—and dynamic—as applied over time to the creation of multiple generations of works—analysis of CC licenses, this Article concludes that CC license proliferation could create systematic and unexpected incompatibilities between licenses. These incompatibilities could result in islands of CC-licensed works that cannot be combined with other types of works.

In presenting this analysis, the Article seeks to contribute to the literature on non-market private-ordering approaches to information production and distribution. This literature began by examining how the rapidly growing activities of open source software development and free culture production and dissemination differ from traditional government-, firm-, and market-directed efforts to create and distribute economic goods, along axes such as participant motivation and transaction cost economics.<sup>12</sup> One strand of this scholarship, which includes recent works by Josh Lerner, Jean Tirole, and Niva Elkin-Koren, scrutinizes the licenses that enable these activities, exploring why license drafters endow licenses with particular provisions, why licensors choose the licenses they do, and how conflicts may arise in the governing legal

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<sup>9</sup> See e.g. Open Source Initiative, *Open Source Initiative OSI – Policies – License Proliferation*, <http://www.opensource2planetjava.org/docs/policy/licenseproliferation.php> (accessed Feb. 6, 2006) (“License proliferation has become a significant barrier to open-source deployment”).

<sup>10</sup> Cf. Lawrence Lessig, *Lessig Blog Archives for February 2004, More on Ping’s Conversation*, <http://www.lessig.org/blog/> (accessed Feb. 6, 2006) (“[CC’s] first and most important objective was to lower the cost of the law — to make it easier for people to signal their preferences effectively, and without the need to hire a lawyer.”).

<sup>11</sup> See Elkin-Koren, *supra* n. 8, at 413-14 & n.130.

<sup>12</sup> See e.g. Yochai Benkler, *Coase’s Penguin, or, Linux and The Nature of the Firm*, 112 Yale L.J. 369 (2002); see also Yochai Benkler, *Sharing Nicely: On Shareable Goods and the Emergence of Sharing as a Modality of Economic Production*, 114 Yale L.J. 273 (2004) (extending this analysis to physical goods and services such as carpooling and distributed computing).

frameworks.<sup>13</sup> These analyses reveal a number of tensions inherent in open source and free culture production systems: between using exclusive rights and restrictive licenses as means and promoting open access as an end; between maximizing license adoption by providing customized licenses to meet the needs of sub-populations of licensors and minimizing the transaction costs that accompany license-type proliferation; and between allowing licensors committed to strong copyleft<sup>14</sup> protection to restrict “non-free” or commercial uses of their works and maximizing the future creation of derivative works. As open source and free culture projects seek to harness and satisfy the complex desires of software and content licensors, these tensions may produce unexpected results. Analyzing the ramifications of these tensions is important to understanding the contours of information flows. It can also help people and projects avoid pitfalls as they develop and deploy tools to facilitate sharing.

This Article analyzes interactions between CC licenses, focusing on incompatibility problems and the resulting evolution of license mix. I define “compatibility” as follows: Works released under compatible licenses can be combined in or used as the joint basis for derivative works; works released under incompatible licenses cannot.<sup>15</sup> Incompatibility problems arise when licenses block would-be creators from making derivative works based on two or more original works released under different CC licenses. Part I explains how CC licenses work and why creators use them. Part II analyzes the dynamics of license interactions in the creation of derivative works. Part III models the evolution of CC-licensed works over time, and Part IV discusses implications of the analysis.

## II. LICENSE STATICS

Since December 2002, CC has offered a number of generic copyright licenses to facilitate the sharing of creative works.<sup>16</sup> Each of the main CC licenses,<sup>17</sup> which can be downloaded from or linked to on the CC website, grants

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<sup>13</sup> Lerner & Tirole, *supra* n. 7, at 21, 24; Elkin-Koren, *supra* n. 8, at 420.

<sup>14</sup> “Copyleft” refers to legal tools and strategies that use intellectual property rights to force openness in subsequent creations, subverting the traditional use of copyright to exclude others. The General Public License (GPL), which underlies many open source software projects, including Linux, is the best known copyleft license.

<sup>15</sup> For an explanation of this focus on derivative works, see *infra* nn. 31-33 and accompanying text.

<sup>16</sup> Creative Commons, *supra* n. 1.

<sup>17</sup> This Article addresses only licenses currently promoted by CC. Previous-generation licenses that have been phased out, though still available on CC’s website, such as NonCommercial 1.0, are excluded. In addition, I exclude CC offerings that are not licenses or are rarely used.

anyone wishing to use the associated copyrighted work a standard set of rights, conditioned on abiding by a number of use restrictions. Licensees have the right to copy, distribute, and publicly display and perform the work (including via webcasts) throughout the world for the duration of the work's copyright,<sup>18</sup> as well as the right to create, copy, distribute, and publicly display and perform derivative works.<sup>19</sup> All other rights are expressly reserved, though the licenses announce that they are not intended to limit rights of fair use, first sale, and other general restrictions on copyright holders' exclusive rights.<sup>20</sup>

Each license conditions its grant of rights on particular behaviors by the licensee. Licensees must provide copyright notice and a copy of or link to the CC license with all copies of the work, and may not redistribute the work under altered versions of the license or use technology to deny others lawful access to the work. In addition to these baseline conditions, licensors can impose one or more of the following restrictions on their works:

<u>License Provision</u>	<u>Description</u>
Attribution (BY)	Licensor requires licensees who distribute, display, or perform the work or derivative works to keep copyright notices intact and give the original author "credit reasonable to the medium" the licensee uses.
Noncommercial (NC)	Licensor prohibits licensee from exercising any rights granted by the license "in any manner primarily intended for or directed toward commercial advantage or private monetary compensation."
ShareAlike (SA)	Licensor requires licensees who distribute, display, or perform derivative works to apply the same CC license to the licensee's derivative work as the licensor applied to her original work; the licensee may not restrict or alter the CC license in any way.

<sup>18</sup> Creative Commons, *Creative Commons, Baseline Rights and Restrictions in All Licenses*, <http://creativecommons.org/about/licenses/fullrights> (accessed Feb. 6, 2006).

<sup>19</sup> Licenses that include a No Derivative Works (ND) provision do not grant licensees any rights to create, distribute, display, or perform derivative works.

<sup>20</sup> Licensors reserve "all rights not expressly granted" by the license, but these reserved rights are necessarily limited by the nature of CC licenses. For example, distributing a work under a CC license alters trademark rights; likely eliminates trade secret protection; and may, at least for certain CC licenses, constitute a waiver of moral rights in some jurisdictions.

No Works (ND)	Derivative Licensor does not grant licensees the right to create, copy, distribute, display, or perform derivative works (not a restriction on the license's grant of rights but rather the absence of a grant of rights that all non-ND CC licenses offer).
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Each provision addresses a distinct concern of creators seeking to share their works. BY is the most common provision, included in every license CC currently offers. Its popularity likely reflects the special importance of status rewards for creators willing to allow access to and use of their works without demanding monetary compensation.<sup>21</sup> Recognition, as an end itself and/or as a means to obtaining financial rewards, is the common motivator among creators who use CC licenses to share their works.

CC licensors use NC provisions in roughly three-quarters of all CC licenses.<sup>22</sup> NC provisions protect creators' works from being used directly for commercial gain. Importantly, however, licensees may create derivative works based on NC-licensed works and distribute those derivative works under a restrictive license, preventing the use of that derivative work by some who might wish to use it. In addition, derivative works based on NC-licensed works, although not commercializable, may serve as inputs for second-generation derivative works that may be commercialized. NC seeks to separate creative works from financial gain, but it is not a perfect prophylactic (second-generation derivative works may be commercialized), nor does it prevent "selfish" creators from restricting access to their derivative works based on input works from the commons.

CC licensors use SA provisions in half of all CC licenses. SA prevents licensees from hijacking freely distributed works for exclusive or proprietary use.<sup>23</sup> By requiring any derivative works based on the original work to be licensed on the same terms as the original work, SA provisions help create an

<sup>21</sup> See Josh Lerner & Jean Tirole, *Some Simple Economics of Open Source*, 50 J. Indus. Econ. 197, 213-14 (2002) (noting the importance of recognition to contributors to open-source software projects); McGowan, *supra* n. 7, at 277, 275-77 (discussing the importance of reputational rewards in motivating open source software programming and arguing that the attribution provisions of the GPL help to "secure reputational payoffs"); see also Benkler, *Sharing Nicely*, *supra* n. 12, at 321-28 (discussing the motivation of sharers and the role of social-psychological rewards in motivating behavior).

<sup>22</sup> See *infra* Appendix A. The data in Appendix A describes links to CC licenses hosted on the CC website and thus may not accurately reflect the relative number of creative works released under each license. In the absence of direct data on license usage, however, it is likely a good proxy, and it is used throughout the Article and the accompanying model.

<sup>23</sup> See Lerner & Tirole, *supra* n. 7, at 26 (discussing "hijacking" of open-source software projects).

intellectual property commons that resists appropriation, forcing anyone making derivative works to perpetuate the same sharing-based regime the original licensor has chosen. There is tension between NC and SA provisions, because including an NC term in an SA license cuts against the primary purpose of SA—growing an intellectual property commons that resists efforts to appropriate creative works—by excluding those who wish to profit from creative works without exerting exclusive control over intellectual property. NC-SA licenses thus exclude actors analogous to generic drug makers in the patent context, who profit from creative inventions without holding intellectual property rights over those inventions.<sup>24</sup>

Finally, ND provisions, which appear in less than one-third of CC licenses, protect the integrity of the licensor's work, allowing others to copy the work but not to modify it.

The provisions are modular.<sup>25</sup> An author can release a story under a BY license, which allows anyone who complies with the standard CC terms to use the story for any purpose they wish—for example, translating the story into Spanish and publishing it in an anthology for commercial distribution—so long as the original author is credited. Another author might release a story under a BY-NC license, requiring attribution and precluding licensees from using the story for commercial purposes, but not otherwise restricting its use. A third author might choose a BY-NC-SA license, requiring attribution, prohibiting commercial use, and forcing any licensee (L1) who uses her story to create a derivative work—a movie adaptation, for example—to release that derivative work under a BY-NC-SA license. Anyone wishing to use L1's movie to create another derivative work—a digital image made by manipulating film stills, for example—must also license that work under BY-NC-SA, and so on. The original BY-NC-SA license thus spreads virally. As discussed below, the ability to combine provisions with distinct and at times divergent purposes into a single license gives rise to tensions within the universe of CC works.

In addition to the standard provisions, CC recently launched licenses to facilitate “sampling,” the use of a work to create a “highly transformative” derivative work:

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<sup>24</sup> See Amy Kapczynski, Samantha Chaifetz, Zachary Katz & Yochai Benkler, *Addressing Global Health Inequities: An Open Licensing Approach for University Innovations*, 20 Berkeley Tech. L.J. 1031, 1091-94 (2005) (discussing the overlapping interests of for-profit generic drug companies and universities concerned with improving global health, in the context of licensing university inventions).

<sup>25</sup> Note, however, that because SA provisions only apply to derivative works, and ND does not grant the right to create derivative works, CC offers no licenses that include both SA and ND.

<u>License Provision</u>	<u>Description</u>
Sampling 1.0	Licensor allows licensees to create, copy, distribute, display, and perform only “highly transformative” derivative works; licensees cannot exercise license rights for “advertising and promotional uses”; attribution required.
Sampling Plus 1.0 <sup>26</sup>	Same as Sampling 1.0, but licensees can also copy, distribute, display, and perform original work for noncommercial purposes.

The sampling licenses allow authors to encourage transformative uses of their works for commercial purposes—for example, using a sound from one song in another commercially-released song—while prohibiting verbatim copying and distribution of the entire work, or allowing such copying and distribution but only for noncommercial purposes. They seek to meet the needs of those that “like the idea of people making a remix of your song, or re-cutting your film, but . . . don’t want them simply to sell whole, unaltered copies of your work.”<sup>27</sup> The sampling licenses also prohibit advertising and promotional uses, so licensees may sample a sound from one song to use in another commercially-released song, but may not use that same sample in a television advertisement.

CC licenses’ grant of rights terminates if the licensee breaches any license terms, leaving licensees vulnerable to copyright infringement claims. Although the enforceability of CC licenses has been a matter of debate,<sup>28</sup> the licenses appear sufficient to serve their purpose. If a licensee breaches the terms of her license, the license immediately strips her of all rights to the copyrighted work,<sup>29</sup> and if she “successfully” challenged the validity or enforceability of a CC license, she would be left without any authorization to use the copyrighted

<sup>26</sup> This license can be combined with NC to create the Noncommercial Sampling Plus 1.0 License, which is identical to BY-NC except that only “highly transformative” derivative works may be created (and copied, distributed, displayed, and performed).

<sup>27</sup> Glenn Otis Brown, *Creative Commons, Mmm . . . Free Samples (Innovation 1a)*, [www.creativecommons.org/weblog/entry/3631](http://www.creativecommons.org/weblog/entry/3631) (accessed Feb. 6, 2006).

<sup>28</sup> A similar debate has arisen over the enforceability of the GPL. For an analysis that concludes that the GPL is likely enforceable, see Jason B. Wacha, *Taking the Case: Is the GPL Enforceable?*, 21 Santa Clara Computer & High Tech. L.J. 451 (2005). See also Stephen Shankland, *GPL Gains Clout in German Legal Case*, CNET News.com, [http://news.com.com/GPL+gains+clout+in+German+legal+case/2100-7344\\_3-5198117.html](http://news.com.com/GPL+gains+clout+in+German+legal+case/2100-7344_3-5198117.html) (accessed Feb. 6, 2006) (reporting a preliminary injunction issued by a German court to stop distribution of a product that violated the GPL).

<sup>29</sup> See Elkin-Koren, *supra* n. 8, at 418.



work.<sup>30</sup> Either way, the copyright holder could enforce his property right to prevent the licensee or third parties from pursuing any undesired uses.

### III. LICENSE DYNAMICS

In analyzing how CC licenses interrelate, how the relative prevalence of different CC licenses is likely to evolve, and how CC licenses will shape future cultural production, the most interesting provisions of CC licenses are those regulating derivative works.<sup>31</sup> The derivative works right, and CC licenses' conditional grant of this right, directly regulates the activity of future creators and thus influences the production of information and cultural goods in a way the copying, distribution, or public performance rights do not. In a society in which the physical inputs, such as computing power and digital video cameras, needed to produce information goods are widely available and becoming more so, the regulation of information inputs, including pre-existing copyrighted works, largely determines how dispersed and democratized cultural production can be. To the extent that the creation of information and cultural goods is a personally, politically, and economically significant activity, restricting the availability of inputs to the creative process by regulating the derivative works right is of substantial importance.<sup>32</sup> Additionally, the regulation of derivative works will likely be the broadest and longest-term effect of a CC license

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<sup>30</sup> If a court could be persuaded that a CC license impermissibly extended the scope of the copyright holder's rights, it is conceivable that it could hold some or all of the restrictive terms unenforceable without invalidating the entire license, thereby defeating the license's purpose. Cf. Madison, *supra* n. 7 (arguing that restrictive forms of software licensing such as open-source/copyleft licensing conflict with traditional understandings of copyright's limits). This seems unlikely. See Wacha, *supra* n. 28, at 476-80; cf. Robin Feldman, *The Open Source Biotechnology Movement: Is It Patent Misuse?*, 6 Minn. J.L. Sci. & Tech. 117, 159-67 (2004) (discussing a similar issue in the context of "open source" patent licensing).

<sup>31</sup> Copyright law defines a derivative work as

a work based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgment, condensation, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship, is a 'derivative work'.

17 U.S.C. § 101 (2000).

<sup>32</sup> See Yochai Benkler, *The Wealth of Networks: How Social Production Transforms Markets and Freedom* (forthcoming 2006) (discussing the increasingly powerful effects of sharing-based production of information goods on the global economy, personal autonomy and development, and the distribution of political power).

because of the viral nature of SA provisions, which spread through the creation of derivative works.

Moreover, the creation of derivative works involves the most complex interactions between CC licenses and raises the specter of license choices giving rise to unexpected consequences. Derivative works are inherently synthetic, often resulting from the combination of one creative work with one or more other works. The creation of derivative works is thus likely to involve combining works subject to different CC licenses, which has the potential to systematically produce outcomes neither expected nor desired by the original licensors of input works. There are other ways licensees can use CC-licensed works as inputs into the creation of new works, principally through fair use or the creation of collective works or anthologies, and the impact of CC license provisions on these re-creative activities is worth examining. But for purposes of this Article, I have chosen to focus on a single phenomenon—the creation of derivative works that use CC-licensed works as inputs—that appears to offer particularly illuminating insights regarding the long-term effects of CC licenses on cultural production.

This Part suggests a categorization of CC licenses based on their regulation of the derivative works right, analyzes how works released under CC licenses in different categories interact, and presents a matrix showing restrictions on derivative works as a function of the type of works on which the derivative work is based. This exercise demonstrates that more restrictive categories of licenses trump less restrictive ones,<sup>33</sup> and that certain licenses are per se incompatible with others.

CC licenses can be grouped into three categories with respect to their treatment of the derivative works right:

1. ND licenses: Do not allow the creation of derivative works.
2. SA licenses: Grant full derivative works rights but require derivative works to be released under the same license as the original work (if derivative works are distributed, displayed, or performed).
3. Non-ND, non-SA licenses: Grant full derivative works rights, with exercise of those rights subject only to the CC license elements for the original work.

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<sup>33</sup> Lerner and Tirole make this point in the context of open source licensing, where copyleft licenses like the GPL trump less restrictive licenses like the BSD-type license. Lerner & Tirole, *supra* n. 7, at 30 n. 20.

### A. ND Licenses

Because ND licenses do not grant licensees the right to make derivative works, ND works cannot be combined with other works and are thus *per se* incompatible with other CC works. While ND is a popular CC provision, included in approximately one-third of CC licenses, ND works constitute an infertile species that will never self-populate—no derivative works can be made from ND works—or breed with other content types—no derivative works can be made from a combination of ND works and non-ND works.

### B. SA Licenses

This second category of licenses raises significant incompatibility concerns. SA works spread the SA license virally; any derivative work that uses an SA-licensed work as an input must itself be licensed under SA. Compatibility issues arise when two “viruses” meet, that is, when a follow-on innovator seeks to create and distribute a derivative work based on multiple pre-existing works subject to different licenses. As with all CC licenses, in determining what restrictions apply to a derivative work, licenses to input works with more restrictive terms trump licenses to input works with less restrictive terms.

Imagine a Beatles song released under BY-SA and a digital musician who wishes to make and release a remix of the song. She can only do so if she releases the remix under a BY-SA license, as shown in Figure 1.A. Now imagine that the artist wants to “mash” or mix together a Jay-Z song, released under BY, with the BY-SA Beatles song. The resulting mash-up must be released under BY-SA, as shown in Figure 1.B. Finally, imagine that the Jay-Z song is released under BY-NC-SA, and again the musician wants to mash it with the BY-SA Beatles song. The Beatles song requires the mash-up to be released under BY-SA, while the Jay-Z song requires it to be released under BY-NC-SA. BY-NC-SA requires imposing the NC restriction on all derivative works,<sup>34</sup> but BY-SA prohibits the imposition of any additional terms—such as NC—on derivative works.<sup>35</sup> The licenses thus block the musician from distributing the

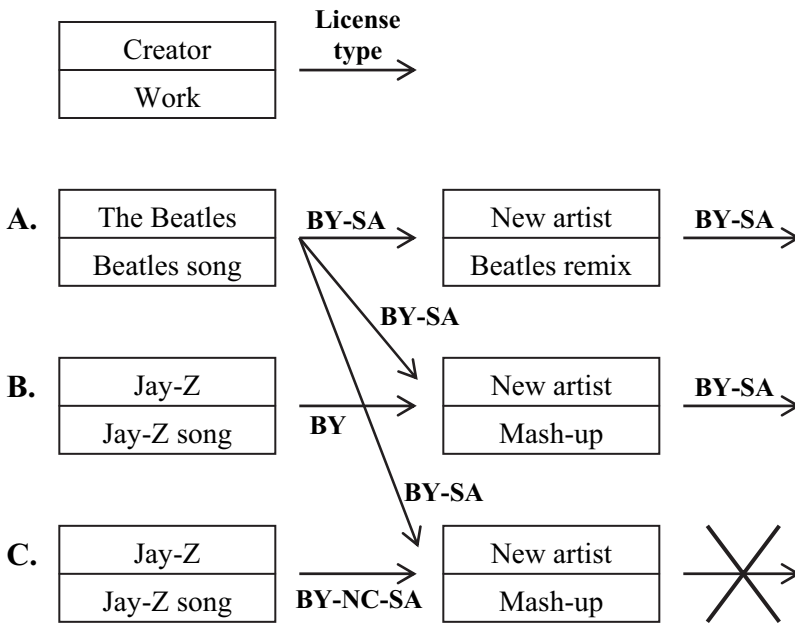
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<sup>34</sup> BY-NC-SA states that licensees “may distribute, publicly display, publicly perform, or publicly digitally perform a Derivative Work only under the terms of this License [or] a later version of this License with the same License Elements,” and that “License Elements’ means . . . Attribution, Noncommercial, [and] ShareAlike.” Creative Commons, *Creative Commons Legal Code, Attribution-NonCommercial-ShareAlike 2.5*, at §§ 1(g), 4(b), <http://creativecommons.org/licenses/by-nc-sa/2.5/legalcode> (accessed Feb. 6, 2006).

<sup>35</sup> Creative Commons, *Creative Commons Legal Code, Attribution-ShareAlike 2.5* § 4(b), <http://creativecommons.org/licenses/by-sa/2.0/legalcode> (accessed Feb. 6, 2005) (“You may

mash-up, as shown in Figure 1.C. This will occur whenever someone seeks to create a derivative work based on multiple pre-existing works subject to different SA licenses.<sup>36</sup> SA licenses can mate with identical SA licenses and with non-SA licenses, but not with other types of SA licenses. With SA licenses covering approximately half of CC works, these viral spread and incompatibility effects may meaningfully shape the distribution of CC licenses and the evolution of CC-licensed works.

FIGURE 1: SA LICENSES



**C. Non-ND, Non-SA Licenses**

Licenses that do not have an ND or SA provision do not raise incompatibility issues with respect to works released under other non-ND, non-

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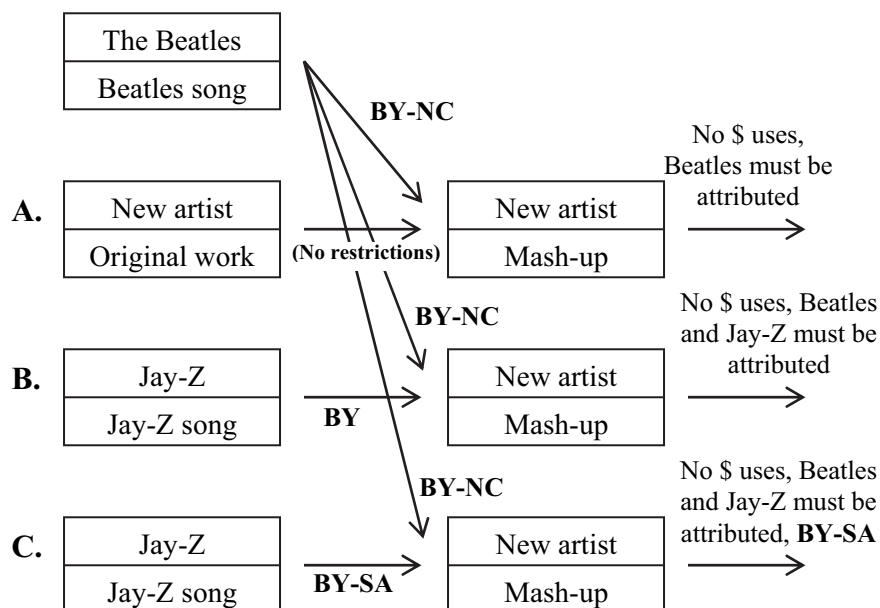
not offer or impose any terms on the Derivative Works that alter or restrict the terms of this License or the recipients' exercise of the rights granted hereunder . . .").

<sup>36</sup> While BY-SA 2.5 and BY-NC-SA 2.5 are the only SA licenses currently promoted on CC's website, works have been released under SA 1.0, NC-SA 1.0, BY-SA 2.0, and BY-NC-SA 2.0, and those licenses are still available on CC's website.

SA licenses. While these licenses may affect the use and distribution of first-generation derivative works (derivative works based directly on CC-licensed content), they do not determine the license form for these derivative works. Moreover, they have no effect on “second-generation derivative works” (derivative works made by transforming a first-generation derivative work and not based directly on CC-licensed works) that do not include direct copies of CC-licensed works. In addition, when licensees use works in this category alongside SA or other non-ND, non-SA works as inputs to make a derivative work, the more restrictive terms trump the less restrictive terms in regulating the derivative work. Unless otherwise noted, I assume derivative works do not include a copy of the original work for purposes of this Article and the associated model.

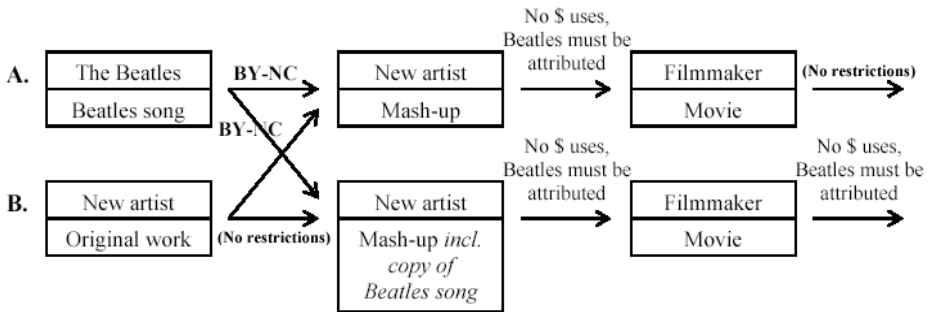
Returning to the mash-up hypothetical, imagine a Beatles song released under BY-NC that a musician mashes with a song in which she holds copyright. The mash-up can be licensed under any terms she wishes, so long as she does not profit from the mash-up and the Beatles song is attributed, as shown in Figure 2.A. Now imagine that the mash-up combines the Beatles song (BY-NC) with a Jay-Z song released under BY. The more restrictive license governs the artist’s use of the mash-up: She cannot commercialize it, as shown in Figure 2.B.

FIGURE 2: NON-ND, NON-SA LICENSES



Note that the dynamics are somewhat different if the derivative work includes a copy of an input work. If a derivative work includes a copy of a non-ND, non-SA original work, the original work’s license terms will restrict some uses of even a second-generation derivative work, though the terms do not necessarily limit the licensing of that second-generation work. For example, if a filmmaker used in a film a modified version of the mash-up shown in Figure 2.A that did not include any portions of the Beatles song, the film would not be subject to the noncommercial and attribution restrictions, as shown in Figure 3.A. But if the mash-up included a sizable portion of the Beatles BY-NC song, and the film incorporated that segment of the mash-up into its soundtrack, the film must respect the attribution and noncommercial restrictions, though it need not be released under a BY-NC license, as shown in Figure 3.B.

FIGURE 3: SECOND-GENERATION DERIVATIVE WORKS



Similarly, if a derivative work includes copies of both a non-ND, non-SA work and an SA work, the derivative work need not (and in fact cannot) be released under the terms of the non-ND, non-SA license. Imagine the mash-up uses the BY-NC Beatles song and a BY-SA song by Jay-Z. The mash-up 1) must attribute both songs, 2) cannot be commercialized, and 3) must be released under BY-SA (if it is released at all), as shown in Figure 2.C. The filmmaker who uses a modified portion of the mash-up that does not include the Beatles song must also release the film under BY-SA, but may commercialize the film—assuming the mash-up’s copyright holder permits it.

Figure 4 offers a comprehensive representation of this understanding of the main CC licenses and the interactions between them in the creation of derivative works. Each column and row is labeled with a type of CC license or with “Unrestricted” for works that do not in any way restrict a creator from using it to make derivative works. Unrestricted includes, for example, works in

the public domain, works the creator of a derivative work holds copyright in, or works the creator has obtained an unrestricted license to use to make derivative works. Unrestricted also represents the absence of a second input work, such that the cell at the intersection of Unrestricted and BY-SA can be understood to include derivative works based only on a single BY-SA work (and the derivative work creator’s ingenuity). Each cell within the matrix provides the licensing provisions that bind a newly-created derivative work based on an input work available under the license in the associated column header and an input work available under the license in the associated row header. An “x” in a cell signifies that a derivative work cannot be created because of restrictions on the input works. The matrix thus demonstrates the required licensing terms governing a derivative work made from each possible combination of CC-licensed works.

FIGURE 4: LICENSE DYNAMICS

Required Licensing for Derivative Works Based on but Not Including Copies of Works (V1 and V2) Licensed Under ...							
V2	V1						
	Unrestricted	BY	BY-NC	Sampling (Plus)	NC Sampling Plus	BY-SA	BY-NC-SA
Unrestricted	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	BY-SA	BY-NC-SA
BY	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	BY-SA	BY-NC-SA
BY-NC	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	BY-SA	BY-NC-SA
Sampling (Plus)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	BY-SA	BY-NC-SA
NC Sampling Plus	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	(No CC terms req'd)	BY-SA	BY-NC-SA
BY-SA	BY-SA	BY-SA	BY-SA	BY-SA	BY-SA	BY-SA	x
BY-NC-SA	BY-NC-SA	BY-NC-SA	BY-NC-SA	BY-NC-SA	BY-NC-SA	x	BY-NC-SA

The matrix illustrates three points made earlier in this Part. First, more restrictive licenses trump less restrictive licenses in regulating derivative works, as shown by the prevalence of BY-SA and BY-NC-SA licenses. Second, non-ND, non-SA licenses do not determine license types for derivative works. Third, BY-SA and BY-NC-SA are incompatible.

#### IV. EVOLUTIONARY MODEL

Having explored how CC licenses interact in a single cycle of derivative work creation, it is now possible to model the evolution of CC-licensed works over a longer time period. To do so I use a highly simplified model based on iterating the matrix in Figure 4.<sup>37</sup> Using data from Yahoo! and CC on the number of web pages linking to each CC license, I first developed estimates for

<sup>37</sup> The model employs a number of simplifying assumptions, the most significant of which are presented in Appendix B, *infra*.

the relative frequency (or “CC market share”) of each of the main CC licenses.<sup>38</sup> By multiplying the CC market share of each license by a variable, the model generates a value for the quantity of works in existence under each CC license; another variable provides a value for Unrestricted. These values are then assigned to the row and column headers in the matrix in Figure 4. This represents the starting point, T1.

To reach the end of the next time period, T2, the model multiplies the associated row and column header values to generate a quantity of newly-created derivative works based on each combination of inputs. For cells representing combinations of works that cannot be made—that is, the cells at the intersection of BY-SA and BY-NC-SA—the resulting quantity is 0. After tallying up the total number of derivative works by required license type—Unrestricted, BY-SA, and BY-NC-SA—and multiplying by another variable for the ratio of newly created derivative works to original works in existence at T1, the model adds the number of newly created derivative works, the number of pre-existing original works, and the number of new, non-derivative works created in T2 to produce a total number of works of each type in existence at the end of T2. The model then runs through the cycle again, using the values for numbers of works in existence at the end of T2 as inputs into the matrix model for T3, and likewise for T4.

The model is run using a ratio of entirely new (non-derivative) works created in a time period to derivative works created in that time period of 1. Appendix C shows the model’s output with a ratio of 0.1.

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<sup>38</sup> See *infra* Appendix A.

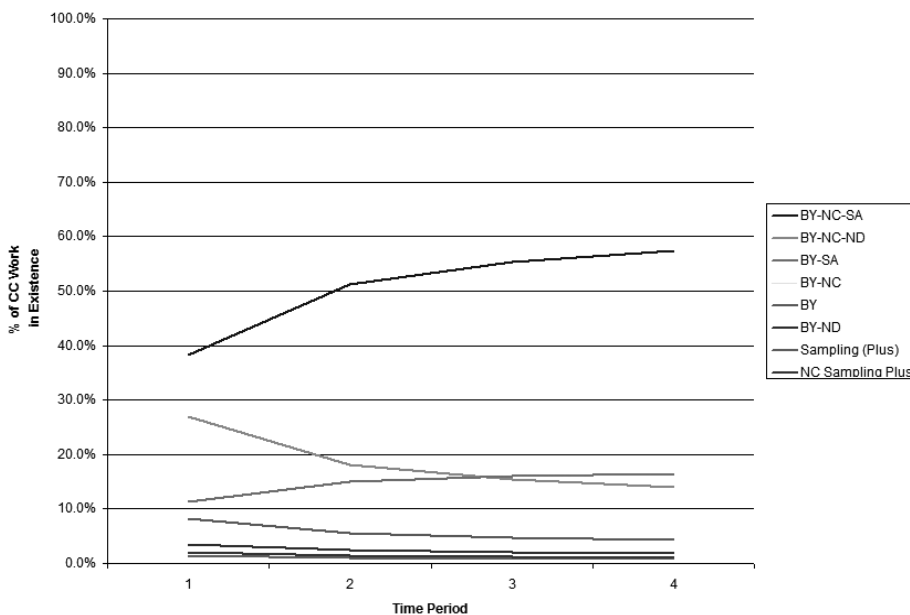


TABLE 1: EVOLUTIONARY MODEL, RATIO OF 1

	% of CC Ws at T1	Total Ws in Existence T1	% of CC Ws at T2	Total Ws in Existence T2	% of CC Ws at T3	Total Ws in Existence T3	% of CC Ws at T4	Total Ws in Existence T4
BY-NC-SA	38.3%	38.3	51%	153.1	55%	291.6	57%	443.6
BY-NC-ND	27.0%	27.0	18%	54.1	15%	81.1	14%	108.2
BY-SA	11.2%	11.2	15%	44.6	16%	84.5	17%	128.1
BY-NC	8.2%	8.2	5%	16.3	5%	24.5	4%	32.7
BY	8.2%	8.2	5%	16.3	5%	24.5	4%	32.7
BY-ND	3.6%	3.6	2%	7.1	2%	10.7	2%	14.3
Unrestricted/PD		1000		3001.3		4972.4		6926.3
Sampling (Plus)	1.5%	1.5	1%	3.1	1%	4.6	1%	6.1
NC Sampling Plus	2.0%	2.0	1%	4.1	1%	6.1	1%	8.2
<b>Total</b>	<b>100%</b>	<b>1100</b>	<b>100%</b>	<b>3300</b>	<b>100%</b>	<b>5500</b>	<b>100%</b>	<b>7700</b>
Total NCs	76%		76%		76%		77%	
Total BYs	100%		100%		100%		100%	
Total NDs	31%		20%		17%		16%	
Total SAs	49%		66%		71%		74%	

Note: "Ws" = works

FIGURE 5: EVOLUTIONARY MODEL, RATIO OF 1



## V. IMPLICATIONS

### A. *Viral Growth of SA Licenses*

As derivative works are created, SA licenses increase their prevalence while the prevalence of other CC licenses remains unchanged. ND and non-ND, non-SA works' share of total CC works thus decreases over time. Because SA provisions are included in half of CC licenses, this could represent a significant effect in the future. In the model, the key driver of this effect is the ratio of entirely new (non-derivative) works created in a time period to derivative works created in that time period. As this ratio shrinks, SA's viral spread increases. A ratio of 10 (10 entirely new works for every 1 derivative work) drives SA licenses from 49.5% of all CC licenses in T1 to 53% of all CC licenses in T4, whereas a ratio of 0.1 generates a 94.1% share for SA licenses in T4. Although four time periods is insufficient to project long-term share outcomes, the first derivative<sup>39</sup> of the SA licenses' market share is strongly downward sloping, suggesting that this effect may rapidly decline in importance. With a ratio of 10, the derivative declines from 4.9% to 1.5% to 0.7% in the time periods T1 → T2, T2 → T3, and T3 → T4, respectively. With a ratio of 0.1, the derivatives are 85.1%, 2.0%, and 0.7%.<sup>40</sup>

### B. *Incompatibilities Between SA Licenses*

Due to the viral growth of SA licenses and the incompatibility of different SA licenses, an SA license that is initially less common and less likely to be used to make derivative works than another SA license may become marginalized. In the model, although BY-SA's total share grows over each of the cycles, it accounts for a smaller and smaller percentage of newly created derivative works. For example, BY-NC-SA and BY-SA respectively account for 77.3% and 22.7% of the SA licenses at T1. Using a ratio of entirely new works created in a time period to derivative works created in that time period of 1, BY-NC-SA and BY-SA respectively account for 83.9% and 16.1% of newly created, CC-licensed derivative works in T2, 89.4% and 10.6% in T3, and 91.5% and 8.5% in T4. BY-SA thus loses out to BY-NC-SA as the latter license spreads

<sup>39</sup> "Derivative" is used here in the mathematical sense not the copyright sense, and loosely, as it is used to describe the rate of change in a discrete- rather than continuous-time-valued process.

<sup>40</sup> Derivatives were calculated as  $((\text{BY-NC-SA } T_n \text{ share} + \text{BY-SA } T_n \text{ share}) - (\text{BY-NC-SA } T_{n-1} \text{ share} + \text{BY-SA } T_{n-1} \text{ share})) \div (\text{BY-NC-SA } T_{n-1} \text{ share} + \text{BY-SA } T_{n-1} \text{ share})$ , where "share" is the number of works released under a particular license in existence at a particular time as a percentage of the total number of CC-licensed works in existence at that time.

more quickly and remains incompatible with BY-SA. If BY-NC-SA spreads sufficiently, BY-SA-licensed works could become isolated, unable to interact with much other CC-licensed content.

### C. *Why This Matters*

The viral growth and incompatibility effects identified here could systematically restrict future creativity in ways that frustrate the desires of today's CC licensors.<sup>41</sup> SA provisions are the most restrictive of all CC licenses. By preventing derivative works from being licensed under any terms other than those in the original work's license, they have the potential to block a wide range of potential uses in the future.<sup>42</sup> These restrictions may frustrate the desires of creators who use non-SA CC licenses and want their works re-used by future creators of derivative works. And these restrictions may also cause dead-hand control problems, as today's SA licensors come to desire that their works be available on less restrictive terms in the future.

As SA licenses spread, they may exert a disproportionate effect on the use of CC works, particularly with respect to the creation of synthetic works like blogs, video collages, and mash-ups. For example, a would-be creator unwilling to license his own work under an SA license will be deterred from producing a derivative work based on both a BY-NC and a BY-NC-SA input work, frustrating the desire of the BY-NC work's creator to have her work re-used in derivative works. Because SA licenses trump other CC licenses when derivative works are created, SA licenses may push non-SA CC licenses to the periphery. And as future creators find themselves forced to choose between using increasingly prevalent BY-NC-SA and BY-SA works as inputs into their derivative works, BY-SA licensors could find their works becoming isolated for re-creation purposes, only combinable with other BY-SA works.

The potential future prevalence of these restrictive provisions highlights a central tension in the open source and free culture movement more generally.

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<sup>41</sup> Compared to the copyright default—"All rights reserved"—CC licenses enable a tremendous amount of re-creation that would not otherwise occur. Any unforeseen drag on future creation is best seen as a small though potentially significant counter-effect of CC licenses. Moreover, this effect can be partially overcome by would-be licensees negotiating with copyright holders for uses unauthorized by CC licenses. This effect is thus particularly likely to occur only where transaction costs prevent individual negotiations from occurring, that is, where a large number of would-be creators of derivative works each seek to use content from multiple previous creators who released their works under different CC licenses.

<sup>42</sup> See Lerner & Tirole, *supra* n. 7, at 22 (classifying stronger copyleft licenses such as the GPL, which requires all future code that includes or is based on GPL-licensed code to be released under the GPL, as more restrictive than non-copyleft ones such as the Berkeley Software Definition (BSD) licenses, which allow commercial uses of BSD-licensed code).

These creators want to promote a creative commons by sharing their work with anyone interested in experiencing it, while also exerting some control over their work. At a minimum, they want recognition, but many also want to require future creators to propagate the licensing scheme they have chosen. The desire to promote open access, realized through aggressive copyleft licenses, may ultimately lead to the closing off of creative works to uses that may be perceived as beneficial by the initial licensors.<sup>43</sup>

A concession is in order. The effects of SA licenses may be neither unexpected nor problematic for most CC licensors. The motivation of creators to use CC licenses is undoubtedly heterogeneous, and varies by creative medium.<sup>44</sup> There may be communities of creators that are not particularly concerned with enabling musicians, filmmakers, bloggers, and the like to re-use their work. For creators such as these, the prospect of their work becoming isolated from other CC-licensed work may not be at all troubling.

## VI. CONCLUSION

The foregoing analysis of CC licenses supports at least three conclusions regarding the creation of derivative works based on CC-licensed works. First, BY-SA and BY-NC-SA licenses trump all other licenses—such that a derivative work based on a BY-SA work and a non-SA work will be licensed under BY-SA—but are incompatible with each other. Second, SA licenses' relative share of all CC licenses expands as more derivative works are created, but this effect is dampened by the ongoing creation of completely new works released under non-SA licenses. Whether the derivative-works-related increase in SA licenses becomes a significant effect depends largely on the ratio of the creation of derivative works based on pre-existing CC-licensed works to the creation of entirely new CC-licensed works, an empirical question on which we appear to lack data. Third, an SA license that is more popular for licensing new works will dramatically increase its share with respect to less popular SA licenses as derivative works are created.<sup>45</sup> Additionally, the empirical data show

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<sup>43</sup> This tension manifests in the open source software world in the debates over GPL versus BSD-type licenses.

<sup>44</sup> See Mike Linksvayer, *Creative Commons, CC Search Index Breakdown*, <http://creativecommons.org/weblog/entry/5311> (accessed Feb. 6, 2006) (CC-licensed audio content is more than 50% likelier than CC-licensed image content to allow commercial use (32% of all audio content versus 19% of all image content) and derivative works creation (78% of all audio content versus 48% of all image content)).

<sup>45</sup> In order for any of these effects to be significant, a substantial number of derivative works must be created based on pre-existing CC-licensed works. While there appears to be no simple way to determine whether this is happening, the existing empirical data—though

that a substantial and perhaps growing percentage of licensors are choosing to use ND licenses.

What do these findings demonstrate about CC's efforts "to build a layer of reasonable, flexible copyright in the face of increasingly restrictive default rules"?<sup>46</sup> The prevalence of ND licenses suggests that a significant subset of licensors may not share CC's vision of a truly "creative commons," where individuals can take pre-existing works from the commons, create new works, and contribute those new works back to the commons. The incompatibility of different SA licenses suggests the limits to the flexibility CC licenses can offer users, further illuminating the tension inherent in using exclusive rights and restrictive licenses to help grow a commons. Finally, the changing shares of different license types as derivative works are created suggests that licensors committed to strong copyleft protections on content may play a disproportionate role in shaping the distribution patterns of creative works in the future.

#### APPENDIX A: EMPIRICAL DATA ON CC LICENSE DISTRIBUTION

The table shows the number of web pages linking to different CC offerings as a percentage of the total number of web pages linking to any CC offering. The data was generated by Yahoo! and reported by CC.<sup>47</sup>

<u>CC Offering</u>	<u>March 2004</u>	<u>February 2005</u>
BY-NC-SA	38%	37%
BY-NC-ND	25%	28%
BY-SA	11%	11%
BY-NC	9%	7%
BY	8%	8%
BY-ND	3%	4%

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limited and bearing on this issue only indirectly—offers some hints. SA licenses declined from 52% to 49% of all CC licenses between March 2004 and February 2005, while ND licenses increased from 29% to 32%. *See infra* Appendix A. This suggests that factors other than those predicted by this model were more important in shaping the distribution of CC licenses in the past year. Note, however, that it is not clear if the two data sets used the same methodology, or how closely web pages linking to CC licenses track the actual number of licensed works.

<sup>46</sup> Creative Commons, *supra* n. 1.

<sup>47</sup> *See* Anupam Chander & Madhavi Sunder, *The Romance of the Public Domain*, 92 Cal. L. Rev. 1331, 1361 & n.163 (2004) (Mar. 2004 data); Neeru Paharia, *Creative Commons Blog*, <http://creativecommons.org/weblog/entry/5293> (accessed Feb. 25, 2005) (Feb. 2005 data).

Public Domain	2%	2%
SA	2%	1%
NC-ND	1%	0%
NC-SA	1%	0%
NC	0%	2%
<hr/>		
Total BY	94%	95%
Total NC	74%	74%
Total SA	52%	49%
Total ND	29%	32%

## APPENDIX B: ASSUMPTIONS UNDERLYING

### THE EVOLUTIONARY MODEL

The evolutionary model relies on a number of assumptions, including the following:

1. CC market share data: Licensing of new non-derivative works in the future will track current CC market shares.
2. Creation rates: The total number of new non-derivative works created in any time period is the same as the number in existence at T1. The total number of new derivative works created in any time period also remains constant (though the license mix may change).
3. Creation of derivative works and copying: Works released under different licenses are copied and modified with the same frequency, and creators are equally likely to combine any type of work with any other. That is, BY-NC works are no more likely to be made into derivative works than BY works.
4. Specific CC licenses: CC licenses no longer offered on the CC website are unimportant moving forward (they are removed from the model). Because the Sampling 1.0, Sampling Plus 1.0, and Noncommercial Sampling Plus 1.0 licenses are so new that no empirical data could be found on them, the model estimates that the Sampling and Sampling Plus licenses (grouped together because they are functionally similar for purposes of this analysis) account for 1.5% of all CC-licensed works and Noncommercial Sampling Plus accounts for 2%.

**APPENDIX C: ADDITIONAL MODEL OUTPUT**

The following table shows the model output using a ratio of 0.1, that is, 10 derivative works for every 1 new work.

**TABLE 2: EVOLUTIONARY MODEL, RATIO OF 0.1**

	% of CC Ws at T1	Total Ws in Existence T1	% of CC Ws at T2	Total Ws in Existence T2	% of CC Ws at T3	Total Ws in Existence T3	% of CC Ws at T4	Total Ws in Existence T4
BY-NC-SA	38.3%	38.3	71%	842.0	74%	2,221.9	75%	4,073.0
BY-NC-ND	27.0%	27.0	5%	54.1	3%	81.1	2%	108.2
BY-SA	11.2%	11.2	21%	244.1	21%	634.9	21%	1,146.6
BY-NC	8.2%	8.2	1%	16.3	1%	24.5	1%	32.7
BY	8.2%	8.2	1%	16.3	1%	24.5	1%	32.7
BY-ND	3.6%	3.6	1%	7.1	0%	10.7	0%	14.3
Unrestricted/PD		1,000.0		12,013.0		22,291.7		31,978.4
Sampling (Plus)	1.5%	1.5	0%	3.1	0%	4.6	0%	6.1
NC Sampling Plus	2.0%	2.0	0%	4.1	0%	6.1	0%	8.2
<b>Total</b>	<b>100%</b>	<b>1,100.0</b>	<b>100%</b>	<b>13,200.0</b>	<b>100%</b>	<b>25,300.0</b>	<b>100%</b>	<b>37,400.0</b>
Total NCs	76%		77%		78%		78%	
Total BYs	100%		100%		100%		100%	
Total NDs	31%		5%		3%		2%	
Total SAs	49%		91%		95%		96%	
<b>Note: "Ws" = Works</b>								