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ARTICLE

THE SOCIOLOGY AND PSYCHOLOGY OF INNOVATION: A SYNTHESIS AND RESEARCH AGENDA FOR INTELLECTUAL PROPERTY SCHOLARS

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ABSTRACT

Intellectual Property (IP) and innovation law scholarship is generally concerned with the question of how to promote socially beneficial innovation. Until recently, the analysis brought to bear on that question in the literature has been dominated by an individual, rational-actor-centered model grounded in the neoclassical economics tradition. Under this model, individual innovators are assumed to respond to innovation incentives in rational ways, unswayed by their social environments or their own psychology.

Of course, as innovation scholars are beginning to recognize, the road to innovation is much more winding and complex than the straight path from incentive to innovation that the rational actor model implies. Innovators are people, and people cannot be divorced from their own psychology or social influences. If scholars truly want to understand how innovation happens and how best to encourage it, they must also understand how innovators' social context and psychology influence both their decisions to innovate or copy and their choices regarding which innovative projects to pursue.

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A rich literature in both the sociological and psychological sciences has remained largely untapped in legal innovation scholarship. In this Article, we discuss how building bridges between these literatures and the legal innovation literature can help legal scholars better understand many of the social forces that influence potential innovators and the psychological factors that explain why these social norms emerge and persist. Among other things, this type of work adds complexity and richness to traditional legal economic accounts of innovation and helps prevent legal innovation scholars from unnecessarily “re-inventing the wheel” by bringing them into conversation with preexisting and well-developed accounts of behaviors relevant to innovation. It also generates testable hypotheses, guiding how legal innovation scholars pose questions and paving the way for new avenues of original research. We conclude this Article by exploring some of the questions that might be particularly promising candidates for original research going forward.

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I. INTRODUCTION

The questions of how innovation comes about and how we should best promote it are, unsurprisingly, of great interest to innovation scholars. They are also incredibly complex. Many innovation scholars choose to tackle that complexity by imposing the simplifying assumptions of a law and economics framework. A growing subset of intellectual property (IP) and innovation scholars, however, have been looking increasingly to other fields to shed light on the innovation process.¹

In thinking about the disciplines beyond economics that might have something interesting to say about innovation, two prime candidates to emerge are the fields of sociology and psychology. Humans are social animals, and despite the persistent myth that innovation is primarily the domain of the lone genius, innovation increasingly occurs in group settings like university research labs, startups, and large research firms.² It is therefore highly likely, if not unavoidable, that social forces will influence the creative process in these and other settings. A sociological account of innovation can shed light on the ways and mechanisms by which they do so, adding nuance and complexity to law and economics accounts that focus on the individual inventor responding to incentives. For example, the unspoken social norms in an innovator's community may subtly steer her away from particular methodologies or research questions.³ A rich literature

1. See generally Michael J. Madison et al., *Constructing Commons in the Cultural Environment*, 95 CORNELL L. REV. 657 (2010); Jeanne C. Fromer, *A Psychology of Intellectual Property*, 104 NW. U. L. REV. 1441 (2010); Gregory N. Mandel, *To Promote the Creative Process: Intellectual Property Law and the Psychology of Creativity*, 86 NOTRE DAME L. REV. 1999 (2011); Laura G. Pedraza-Fariña, *Patent Law and the Sociology of Innovation*, 2013 WIS. L. REV. 813; Dan L. Burk, *Patent Silences*, 69 VAND. L. REV. 1603 (2016); William Hubbard, *Inventing Norms*, 44 CONN. L. REV. 369 (2011); Anthony J. Casey & Andres Sawicki, *The Problem of Creative Collaboration*, 58 WM. & MARY L. REV. 1793 (2017); Joseph P. Fishman, *Creating Around Copyright*, 128 HARV. L. REV. 1333 (2015). While all of these scholars look to psychology and sociology to shed light onto the innovation process, a parallel body of scholarship uses psychology, sociology, and history to examine the social uses and meanings of patent law beyond as a driver of innovation. See generally, e.g., Dan L. Burk, *On the Sociology of Patenting*, 101 MINN. L. REV. 421 (2016); Kara W. Swanson, *Beyond the Progress of the Useful Arts: The Inventor as Useful Citizen*, 60 HOUS. L. REV. (forthcoming Dec. 2022) (on file with the *Houston Law Review*); Kara W. Swanson, "Great Men," *Law, and the Social Construction of Technology*, 43 LAW & SOC. INQUIRY 1093 (2018); Jason Rantanen & Sarah E. Jack, *Patents as Credentials*, 76 WASH. & LEE L. REV. 311 (2019).

2. See Stephanie Plamondon Bair, *Innovation Inc.*, 32 BERKELEY TECH. L.J. 713, 728–34 (2017).

3. See generally Pedraza-Fariña, *Patent Law*, supra note 1; Laura G. Pedraza-Fariña, *The Social Origins of Innovation Failures*, 70 SMU L. REV. 377 (2017);

in sociology also explores how inventors' social networks can both contribute to and hinder the development and diffusion of new ideas, identifying particular network structures that tend to undergird breakthrough innovation.⁴ The insights and methodologies emerging from this literature, however, have received little attention in IP scholarship.

Innovators, as humans, are also subject to complex psychological forces that the simplifying assumptions of a law and economics approach don't fully capture. For example, creators may create for a variety of reasons that have little to do with the pecuniary rewards IP scholars consider paramount for encouraging innovation.⁵ Innovators may also be thwarted in their creative pursuits by psychological factors, like a perceived lack of autonomy or variety that may, at first glance, appear to have little to do with the creative process.⁶ An exploration of these forces can lead to important insights about how innovation occurs and tangible prescriptions for promoting it going forward.

Both sociological and psychological approaches, then, have great potential to shed light on questions of innovation, as scholars have begun to recognize. But perhaps the real untapped potential in these approaches is in combining them to provide a more generalized and comprehensive account of the forces that guide innovation in productive (or less-than-productive) directions. Specifically, social norms, including norms relevant to innovation, arise in part from individual actions of group members. To fully understand social norms, then, it is helpful to understand what motivates the individual actions that give rise to them.

In this Article, we illustrate how sociological and psychological analyses can be combined to identify and explain a

Stephanie Plamondon Bair & Laura G. Pedraza-Fariña, *Anti-Innovation Norms*, 112 NW. U. L. REV. 1069 (2018).

4. See generally, e.g., Balázs Vedres & David Stark, *Structural Folds: Generative Disruption in Overlapping Groups*, 115 AM. J. SOCIO. 1150 (2010); Sinan Aral & Marshall Van Alstyne, *The Diversity-Bandwidth Trade-Off*, 117 AM. J. SOCIO. 90 (2011); Mathijs de Vaan et al., *Game Changer: The Topology of Creativity*, 120 AM. J. SOCIO. 1144 (2015); Olav Sorenson, *Regional Ecologies of Entrepreneurship*, 17 J. ECON. GEOGRAPHY 959 (2017).

5. See generally, e.g., JESSICA SILBEY, *THE EUREKA MYTH: CREATORS, INNOVATORS, AND EVERYDAY INTELLECTUAL PROPERTY* (2015); Peter DiCola, *Money from Music: Survey Evidence on Musicians' Revenue and Lessons About Copyright Incentives*, 55 ARIZ. L. REV. 301 (2013); Jonas Anderson, *Nonexcludable Surgical Method Patents*, 61 WM. & MARY L. REV. 637 (2020); Ofer Tur-Sinai, *Beyond Incentives: Expanding the Theoretical Framework for Patent Law Analysis*, 45 AKRON L. REV. 243 (2012); Madhavi Sunder, *IP³*, 59 STAN. L. REV. 257 (2006).

6. See generally Stephanie Plamondon Bair, *The Psychology of Patent Protection*, 48 CONN. L. REV. 297 (2015).

phenomenon of interest to innovation scholars: the emergence and persistence of social norms in creative settings that have both positive, pro-innovation and harmful, anti-innovation effects. We build upon our prior work on “anti-innovation norms”—those that interfere with boundary-crossing innovation with particularly harmful effects on innovation⁷—to illustrate how a dual psychology–sociology approach can help understand the emergence and effect of social norms on innovation.

The examination of pro- and anti-innovation norms highlights the various advantages to be gleaned from a translational approach that draws from the fields of sociology and psychology. In the penultimate part of this Article, we examine some of these benefits. One of these is the generation of new, testable hypotheses. We conclude this Article by exploring some of these hypotheses and how innovation scholars might use original research to answer them.

II. SOCIOLOGICAL ACCOUNTS OF BEHAVIOR

From a sociological perspective, a key defining characteristic of an individual inventor or artist is her *embeddedness* in a community or communities of peer inventors or artists. This embeddedness—and the strength of her ties to her various peer groups—influences many of her creative choices: from what problems to tackle to what methods to use in tackling those problems and evaluating the worth of her peers’ work. Much work in sociology, and in science and technology studies (STS) in particular, has been devoted to understanding how communities of researchers or artists form, how they change over time, and how they develop and deploy the often-rich array of social norms that bind their members’ actions.

Although now incorporated into mainstream sociological research, the idea that technological progress is shaped by social forces was, in the 1960s and 1970s, part of a countercultural scholarly agenda that pushed against well-established post-Enlightenment traditions. These traditions viewed technological progress as guided by an internal, purely scientific and technological logic, perhaps also influenced by “economic

7. See generally Pedraza-Fariña, *Social Origins*, supra note 3 (exploring how social norms can interfere with socially beneficial boundary-crossing innovation).

imperatives” but certainly divorced from social influences.⁸ In this view, it was the work of individual “great minds” that drove scientific and technological progress by brilliantly and painstakingly plying away from nature its deeply held—yet immanent—natural laws and patterns.⁹ STS sought to open up this proverbial “black box” of technology to reveal how both the direction and content of technology was contingent on social influences.¹⁰

The unit of analysis for these countercultural sociologists varied in scope: many focused on meso-level processes, mapping the boundaries of clashing scientific communities engaged in scientific controversies,¹¹ while others carried out more micro-level ethnographic studies of individual research sites.¹² All of these approaches, however, shared a preoccupation with understanding both how individual action is shaped by socialization into particular research subcultures and how the boundaries between subcultures are both maintained and subverted.¹³

Sociologists have given these subcultures different names and analyzed them using distinct—while often overlapping—theoretical constructs. For example, Ludwik Fleck, one of the forerunners of the STS tradition, spoke of “thought collectives”—communities of persons who mutually exchange ideas and whose “thought style” determines what can be counted as a legitimate

8. See, e.g., Sophia Roosth & Susan Silbey, *Science and Technology Studies: From Controversies to Posthumanist Social Theory*, in THE NEW BLACKWELL COMPANION TO SOCIAL THEORY 451, 452–56 (Bryan S. Turner ed., 2009).

9. See generally *id.* at 455–66 (listing individual scientists and their contributions to various fields through independent theorization and experimentation); Pedraza-Fariña, *Patent Law*, *supra* note 1, at 841–42.

10. See, e.g., Steven Shapin, *Here and Everywhere: Sociology of Scientific Knowledge*, 21 ANN. REV. SOCIO. 289, 298–99, 307–08 (1995) (discussing the STS movement); Roosth & Silbey *supra* note 8, at 459 (same); Pedraza-Fariña, *Patent Law*, *supra* note 1, at 835–38 (collecting references on the STS literature).

11. See, e.g., ANDREW PICKERING, *CONSTRUCTING QUARKS: A SOCIOLOGICAL HISTORY OF PARTICLE PHYSICS* 114–15 (1984) (describing the divisions between different theoretical physicists in the field of particle physics in the late 1960s); HARRY COLLINS & TREVOR PINCH, *THE GOLEM: WHAT EVERYONE SHOULD KNOW ABOUT SCIENCE* 18–21 (1993) (detailing disagreements that arose between two sets of researchers who were studying the chemical transfer of memory between rats and mice).

12. See, e.g., Karin D. Knorr-Cetina, *The Ethnographic Study of Scientific Work: Towards a Constructivist Interpretation of Science*, in SCIENCE OBSERVED: PERSPECTIVES ON THE SOCIAL STUDY OF SCIENCE 115, 117 (Karin D. Knorr-Cetina & Michael Mulkay eds., 1983).

13. See *id.* at 115–17; PICKERING, *supra* note 11, at 114–15; COLLINS & PINCH, *supra* note 11, at 116–18.

research question and how to interpret scientific observations.¹⁴ Another influential sociological tradition focuses on mapping “social worlds” defined by a set of shared ways of talking about and “doing” research. Scholars have used the social worlds framework to analyze the types of conflict and negotiation that take place when different social worlds interact.¹⁵ Sociological studies of the professions and of expertise provide yet another lens through which to analyze the formation of inventors and scientific communities. This perspective traces the development of a professional culture and of professional vested interests through processes of training and credentialing. In this framework, the constant competition between professions over claims of legitimate expertise and for control over resources is seen as essential to understanding the direction and content of scientific and technological knowledge.¹⁶ Regardless of the specific label for these communities—“thought collectives,” “social worlds,” or “expert communities”—one generalizable insight emerges: these communities develop (often clashing) ways of thinking that prioritize some types of problems, as well as particular correct ways of doing work to solve those problems, and of evaluating the results of that work.¹⁷

Another view, developed also from sociology, focuses on the strength of the ties between individuals and uses the resulting networks of interactions as a tool to map different innovator social worlds and their evolution over time. This “network approach”—

14. LUDWIK FLECK, GENESIS AND DEVELOPMENT OF A SCIENTIFIC FACT 39 (Thaddeus J. Trenn & Robert K. Merton eds., Fred Bradley & Thaddeus J. Trenn trans., 1972); Ilana Löwy, *Ludwik Fleck on the Social Construction of Medical Knowledge*, 10 SOCIO. HEALTH & ILLNESS 133, 135 (1988). Fleck’s work deeply influenced that of Thomas Kuhn, whose groundbreaking work, *The Structure of Scientific Revolutions*, challenged prevailing understandings of scientific progress as a series of linear, incremental steps towards scientific truth. In its stead, Kuhn proposed a view of scientific “progress” as a contest between scientific “paradigms,” understood as coherent bodies of knowledge and practices that shape the way questions are asked and information is gathered. THOMAS S. KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* 12 (4th ed. 2012).

15. See, e.g., Joan H. Fujimura, *The Molecular Biological Bandwagon in Cancer Research: Where Social Worlds Meet*, 35 SOC. PROBS. 261, 262 (1988); Adele E. Clarke & Susan Leigh Star, *The Social Worlds Framework: A Theory/Methods Package*, in *THE HANDBOOK OF SCIENCE AND TECHNOLOGY STUDIES* 113 (Edward Hackett et al. eds., 3d ed. 2007).

16. HARRY COLLINS & ROBERT EVANS, *RETHINKING EXPERTISE* 118–19, 133 (2007); Harry Collins et al., *Trading Zones and Interactional Expertise*, 38 STUD. HIST. & PHIL. SCI. 657, 658–59 (2007); ANDREW ABBOTT, *THE SYSTEM OF PROFESSIONS: AN ESSAY ON THE DIVISION OF EXPERT LABOR* 2–3 (1988); Laura G. Pedraza-Fariña, *Understanding the Federal Circuit: An Expert Community Approach*, 30 BERKELEY TECH. L.J. 89, 108–09 (2015).

17. See *infra* Section II.A.

much like the social worlds approach—is deeply relational. It links the direction and pace of innovation to the connections among individuals (both within and across communities), which serve as conduits for the transmission of information and also as a type of social “glue” to build trust among community members.¹⁸ An important controversy in the knowledge networks literature centers around the extent to which particularly creative or “breakthrough” innovation is facilitated by either (a) community cohesion—mediated by strong community ties—or (b) bridging connections across distant communities. In the first model, cohesion breeds trust, which is seen as crucial for information-sharing and collaboration.¹⁹ In the second, bridging ties that bring together distant networks enhances creativity by exposing community members to different ways of framing and solving problems and new methodological techniques.²⁰ A number of network studies have shown that innovation needs both trust and access to novel ideas, but these forces pull in opposite directions: we tend to trust those who are most like ourselves but those people are also less likely to be able to provide us with the fresh ideas that are also necessary for innovation.²¹ This is why, from a policy perspective, fostering breakthrough innovation is particularly challenging.

Until quite recently, IP scholarship all but ignored sociology’s challenge to the “great minds” view of innovation. Accounts of innovation in the legal academy mirrored quite closely those post-Enlightenment traditions that STS scholarship sought to displace—portraying innovation as driven largely by technological and market forces and proceeding in a linear path towards the ever-increasing accumulation of knowledge. In this view, individuals (or firms) responded rationally and equally to market

18. See, e.g., Mark S. Granovetter, *The Strength of Weak Ties*, 78 AM. J. SOCIO. 1360, 1370 (1973); RONALD S. BURT, STRUCTURAL HOLES: THE SOCIAL STRUCTURE OF COMPETITION 49 (1992); Vedres & Stark, *supra* note 4, at 1153–54; De Vaan et al., *supra* note 4, at 1145; Sorenson, *supra* note 4, at 963–64.

19. See, e.g., James S. Coleman, *Social Capital in the Creation of Human Capital*, 94 AM. J. SOCIO. S95, S97, S118–19 (Supp. 1988); Ray Reagans & Bill McEvily, *Network Structure and Knowledge Transfer: The Effects of Cohesion and Range*, 48 ADMIN. SCI. Q. 240, 255 (2003); David Obstfeld, *Social Networks, the Tertius Iungens Orientation, and Involvement in Innovation*, 50 ADMIN. SCI. Q. 100, 127 (2005).

20. See, e.g., Granovetter, *supra* note 18, at 1370–71; BURT, *supra* note 18, at 28.

21. See, e.g., Brian Uzzi & Jarrett Spiro, *Collaboration and Creativity: The Small World Problem*, 111 AM. J. SOCIO. 447, 462–63 (2005); Vedres & Stark, *supra* note 4, at 1154; De Vaan et al., *supra* note 4, at 1185–86; BURT, *supra* note 18, at 15.

and patent incentives.²² A growing body of scholars, however, has begun to challenge this once-canonical view. As case study after case study of creative communities revealed that IP incentives travel through a thick network of social norms that deeply influence individual-inventor behavior, IP scholars have turned their attention to understanding the interaction between informal social norms and formal legal constraints.²³

Yet, this nascent IP literature has focused largely on social norms that function outside of the creative process itself: the social norms described in most studies have to do with how communities of creators manage the sharing and copying of original creative works but say little about how social norms, and social contexts, shape the creative process itself. In other words, this scholarship still black boxes creativity and innovation.²⁴

In our own joint research, we placed this body of STS and network science literature in conversation with IP and social norms scholarship to interrogate how social norms shape the generation of knowledge embodied in inventions and creative works themselves. We advanced the idea that creative communities are characterized by a set of “boundary-preserving” social norms—which we describe as (1) “research priority,” (2) “methodology,” and (3) “evaluation norms.”²⁵ These boundary-preserving norms deeply influence the direction of innovation—privileging research programs that fit squarely within the community’s dominant paradigm and discouraging boundary-crossing collaborations. Put differently,

22. See, e.g., WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 300 (2003).

23. See, e.g., Bair & Pedraza-Fariña, *supra* note 3, at 1071 & n.4, 1083 n.66 (collecting sources); Hubbard, *supra* note 1, at 403; Madison et al., *supra* note 1, at 664; Michael Mattioli, *Communities of Innovation* 106 NW. U. L. REV. 103, 133 (2012); Guy A. Rub, *Owning Nothingness: Between the Legal and the Social Norms of the Art World*, 2019 BYU L. REV. 1147, 1150; Elizabeth L. Rosenblatt, *IP Law in the Shadow of Norms*, CARDOZO ARTS & ENT. L.J. (forthcoming 2022) (manuscript at 15). See generally CREATIVITY WITHOUT LAW: CHALLENGING THE ASSUMPTIONS OF INTELLECTUAL PROPERTY (Kate Darling & Aaron Perzanowski eds., 2017) (exploring how social norms can promote creativity in the absence of legal regimes).

24. Some of these social norms do indirectly influence creative practices to the extent that they make knowledge produced by others in the community more or less available for re-use and follow-on innovation through norms of secrecy and sharing. See, e.g., Uzzi & Spiro, *supra* note 21, at 449–50.

25. Bair & Pedraza-Fariña, *supra* note 3, at 1095–1103. This set of social norms parallels findings in the STS literature that clashes between different communities often arise around (1) the choice of topic that is theoretical relevant to each community; (2) the “correct” methodology to answer research questions; and (3) access to material and reputational resources.

boundary-preserving norms do a good job of creating trust (by constructing communities with shared goals and methodologies), but they often do so at the expense of exposure to (and acceptance of) diverse “thought styles.” We coined the term “anti-innovation norms” to describe instances in which these boundary-preserving social norms have an overall welfare-reducing effect. Social norms form part of an underlying innovation ecosystem that interacts with formal legal incentives. From the perspective of IP and innovation policy, then, understanding social norms’ both anti- and pro-innovation effects is crucial to designing effective policy interventions.

A. *How Sociological Accounts Help Explain Anti-Innovation Norms*

An example is illustrative of the utility of an account of innovation that focuses on innovator communities, their community social norms, and their interaction with other innovator communities. In 2002, spurred by a National Institutes of Health (NIH) initiative that sought to provide seed funding for interdisciplinary consortia, a group of scientists and clinicians hailing from different innovator communities submitted a grant proposal for the study of cancer-treatment-related infertility.²⁶ The resulting consortium, the Oncofertility Consortium, would go on to become an international, multi-institute group independent of that original NIH funding.²⁷ The Oncofertility Consortium addressed a long-standing gap in cancer care: the lack of research on the effects of cancer drugs on fertility and on fertility-preservation techniques for cancer patients. This knowledge gap presents a puzzle for internalist theories of technological change, because while there was a strong market demand from cancer patients for increased fertility-preservation options, such market demand had not translated into increased research activity. That these market forces were not sufficient to spur increased research in this area, however, is not puzzling from

26. Laura G. Pedraza-Fariña, *Constructing Interdisciplinary Collaboration: The Oncofertility Consortium as an Emerging Knowledge Commons*, in GOVERNING MEDICAL KNOWLEDGE COMMONS 259, 259–61, 264 (Katherine J. Strandburg et al. eds., 2017).

27. In the case of the Oncofertility Consortium, this short-term funding appears to have functioned as an effective scaffold that brought together members of disparate social worlds. This observation is consistent with the concept of “staged intersections”—short-term events where multiple social worlds come together in a way that plants the seeds for long-term, continuing collaboration. Karin Garrety, *Science, Policy, and Controversy in the Cholesterol Arena*, 21 SYMBOLIC INTERACTION 401, 403 (1998).

a sociological perspective. One fundamental reason for this disconnect between the needs of cancer patients and research and treatment priorities was the “lack of communication and collaboration between oncologists and reproductive endocrinologists.” Oncologists and reproductive endocrinologists occupied separate social worlds with distinct—and often clashing—research priority, methodology, and evaluation norms that prevented this social welfare-enhancing collaboration.²⁸

Oncologists’ research priorities were life extension—not fertility preservation—and understanding the mechanisms that control cell division. While this focus on cell division led to the development of powerful chemotherapeutic drugs, it also created a second-order problem: how to deal with the infertility resulting from their use. Oncologists simply ignored this problem: it was not part of their research agenda. For their part, endocrinologists privileged understanding infertility in otherwise healthy women and paid little attention to this special subtype of infertility. As a consequence, the intersectional problem of “chemotherapeutic-driven infertility” remained understudied—despite market pressures to the contrary. Most importantly, each group’s different research priority norms actively discouraged efforts to work collaboratively at the intersection of both fields. Neither the oncology nor the endocrinology communities were willing to provide financial backing for such boundary-crossing projects. Specialty journals would not publish their research findings. All the while, research projects that fell squarely within the research priorities of the respective oncology and endocrinology communities were routinely rewarded with grant awards and job-promotion opportunities.²⁹

Methodology norms also played an important role in maintaining the gap between oncology and endocrinology communities. Methodology norms can be best understood as the particular “technology” or set of “rituals” or “entrenched practices” that people in any given community prefer to use to solve problems of interest.³⁰ Methodology and research norms are often linked: communities tend to prioritize problems that are amenable to being solved with their preferred methodology. Both oncology and endocrinology communities had entrenched practice styles that did not lend themselves to addressing infertility in cancer

28. See Pedraza-Fariña, *Constructing Interdisciplinary Collaboration*, *supra* note 26, at 261–62, 265–66.

29. *Id.* at 267.

30. See Bair & Pedraza-Fariña, *supra* note 3, at 1099–1100, 1099 n.168.

patients. For oncologists, their routine clinical care guidelines did not include what are now standard questions about their patients' reproductive plans. And no referral corridor existed between oncologists and endocrinologists, so that if a patient needing to undergo chemotherapy for a life-threatening cancer wanted to resort to fertility-preservation techniques, very few (if any) IVF clinics were equipped to perform emergency procedures. Instead, these clinics' routine practices revolved around providing care for otherwise healthy patients who had ample time to prepare.³¹

Finally, evaluation norms often serve to reinforce research priority and methodology norms. What is considered good work by core community members reflects the community's research and methodological priorities and will create incentives for marginal group members to conform to those priorities in order to access the benefits of group membership. Prior to obtaining support through an NIH grant specifically targeting "orphan" problems requiring interdisciplinary collaboration, pioneering researchers interested in studying cancer-related infertility could get no funding from either specialized oncology or endocrinology agencies.³²

Research priority, methodology and evaluation norms are initially established at the group level for rational reasons: they serve as efficient coordination mechanisms that benefit the group and its members. These norms then provide the basis for the primary motivators for work in these areas: job opportunities, publication, and status within the community. But when these norms unsurprisingly become rigidly embedded into community routines, they can ultimately lead to their socially inefficient overenforcement: disincentivizing boundary crossing by punishing those who resist shared community norms, even when doing so would be socially beneficial. In these cases, the professional vested interests of powerful group members act as inefficient gatekeepers—helping entrench these norms simply because they protect their valuable investment of time and resources in addressing particular problems with specific methodologies.³³ As we argue in Part III, a psychological approach to norm development can help further clarify how and why socially inefficient norms may be maintained.

31. See Pedraza-Fariña, *Constructing Interdisciplinary Collaboration*, *supra* note 26, at 266, 272.

32. *Id.* at 273.

33. Bair & Pedraza-Fariña, *supra* note 3, at 1076.

But what about the benefits of social norms traditionally emphasized by IP and innovation scholars? The next section provides a sociological account of pro-innovation norms, raising important questions as to the role of law and policy interventions in influencing these two types of norms.

B. How Sociological Accounts Help Explain Pro-Innovation Norms

A large body of case study-driven IP literature has investigated the role of social norms in promoting creativity and innovation in communities where IP protection is weak, unavailable, or simply not relied upon.³⁴ Taken together, this growing number of case studies shows that community social norms can regulate copying behavior in the absence of IP protection—punishing “free loaders” while rewarding those who respect other community members’ work. What constitutes “free loading” and “respectful copying” varies from community to community. In the case of French chefs, for example, sanctions are limited to those chefs who fail to properly credit a recipe’s creator, whereas copying with attribution is encouraged.³⁵ Comedians, on the other hand, frown upon even the slightest hint of copying the overall general premise or structure of a joke.³⁶ In contrast, open source software communities routinely share and build upon each other’s work, provided follow-on innovators also make their work available for re-use.³⁷ In other words, in many communities, informal social norms function much like formal IP protection: by policing unauthorized copying. But unlike IP protection, these social norms are not one-size-fits-all; rather, social norms can evolve to fit each community’s innovation needs. Whether these social norms that regulate copying behavior are always or even mainly innovation promoting, however, remains unclear.

34. See generally, e.g., *id.*; Hubbard, *supra* note 1; Madison et al. *supra* note 1; Mattioli, *supra* note 23; Rub, *supra* note 23; Rosenblatt, *supra* note 23; Aaron Perzanowski, *Owning the Body: Creative Norms in the Tattoo Industry*, in *CREATIVITY WITHOUT LAW: CHALLENGING THE ASSUMPTIONS OF INTELLECTUAL PROPERTY* 94–96 (Kate Darling & Aaron Perzanowski eds., 2017).

35. Emmanuelle Fauchart & Eric von Hippel, *Norms-Based Intellectual Property Systems: The Case of French Chefs*, 19 *ORG. SCI.* 187, 192–94 (2008).

36. See Dotan Oliar & Christopher Sprigman, *There’s No Free Laugh (Anymore): The Emergence of Intellectual Property Norms and the Transformation of Stand-Up Comedy*, 94 *VA. L. REV.* 1787, 1790–91 (2008).

37. See Josh Lerner & Jean Tirole, *Some Simple Economics of Open Source*, 50 *J. INDUS. ECON.* 197, 201 (2002).

From a sociological perspective, these pro-innovation norms can be understood as a result of group cohesion. Cohesive communities, whose members share strong ties with each other and where “everyone is connected such that no one can escape the notice of others,” facilitate the emergence of both strong sanctions for norm-breaking and high rewards for norm-following.³⁸ The availability of strong sanctions and rewards is, in turn, essential for the emergence of trust among community members that each member will respect the dominant social norms. In the cohesion or “closure” literature, increased trust is associated with a wealth of positive effects.³⁹ Trust allows for the efficient diffusion of information within the group by generating more reliable communication channels. Trust also enables coordination and collaboration while preventing shirking (a form of free riding when one group member avoids, neglects, or off-loads personal responsibilities onto other members of the group).⁴⁰

Nevertheless, there is reason to be at least somewhat skeptical that in-group social norms maintained through trust have a consistently positive impact on innovation. First, rather than create more reliable information, trust can also serve to amplify disinformation or to confirm preexisting beliefs.⁴¹ Second, the levels of trust generated in cohesive communities can also help explain why research priority, methodology, and evaluation norms are often over-enforced. In cohesive groups, the availability of strong sanctions simultaneously develops trust and discourages marginal group members from collaborating with outside communities with a different set of research priority, methodology and evaluation norms.

III. PSYCHOLOGICAL ACCOUNTS OF BEHAVIOR

Just as innovators are influenced by their social environments, so too are they motivated by their own psychology. Indeed, the social norms just discussed are often driven and maintained in part by the psychology of the individuals who make up the relevant social groups. To fully understand these social forces and how innovation scholars can harness them to their

38. Ronald S. Burt, *Structural Holes Versus Network Closure as Social Capital*, in *SOCIAL CAPITAL: THEORY AND RESEARCH* 31, 37–38 (Nan Lin et al. eds., 2001).

39. See generally Coleman, *supra* note 19, at S101; Katja Rost, *The Strength of Strong Ties in the Creation of Innovation*, 40 RSCH. POL’Y 588, 591 (2011).

40. Coleman, *supra* note 19, at S107–08; Burt, *supra* note 38, at 37.

41. See Burt, *supra* note 38, at 36.

benefit (while avoiding their pitfalls) in crafting a robust innovation policy, it is necessary to examine the forces that drive behavior and, ultimately, norms, at the psychological level.

The psychology literature's extensive characterization of decision-making bias is one area that offers some important insights. For decades, psychologists have been aware that people do not always pursue rational decision-making strategies.⁴² For example, humans are subject to cognitive biases that override rational decision-making and cause them to depart from optimality in their decisions in many instances.⁴³ For anyone familiar with human nature, this insight might not seem particularly surprising. What is remarkable about the bias literature, however, is not simply the recognition that decision-making bias exists. Instead, it is the discovery that humans tend to be biased in similar ways under similar circumstances, paving the way for empirical study and characterization of these biases.⁴⁴

Legal scholars have not been blind to the relevance of the cognitive bias literature for legal analyses. Most prominent among the appearances of the bias literature in legal scholarship is the law and behavioral economics movement, which represents an explicit attempt to harness psychologists' understanding of bias to add realistic complexity to traditional economic analyses of law.⁴⁵ But despite this larger trend, innovation scholars, with some exceptions,⁴⁶ have been relatively slow to welcome the insights the cognitive bias literature has to offer into a field dominated by economic analysis.

In spite of this reluctance, the cognitive bias literature has great untapped potential for illuminating how innovation takes place in real-world settings. And, as we demonstrate here, this potential goes beyond just explaining how individual innovators might respond to the innovation incentives presented to them through IP, grants, tax breaks, or other mechanisms—although

42. Benedetto De Martino et al., *Frames, Biases, and Rational Decision-Making in the Human Brain*, 313 SCI. 684, 684 (2006).

43. *Id.*

44. See generally Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263 (1979); Amos Tversky & Daniel Kahneman, *Availability: A Heuristic for Judging Frequency and Probability*, 5 COGNITIVE PSYCH. 207 (1973); Daniel Kahneman et al., *Experimental Tests of the Endowment Effect and the Coase Theorem*, 98 J. POL. ECON. 1325 (1990).

45. Bair, *supra* note 6, at 313.

46. See generally, e.g., Christopher Buccafusco & Christopher Jon Sprigman, *The Creativity Effect*, 78 U. CHI. L. REV. 31 (2011); Mandel, *supra* note 1; Fromer, *supra* note 1.

that certainly is a valuable contribution. In addition to insights about individuals, the cognitive bias literature can also help illuminate the social forces that drive creators to act in particular ways throughout the innovation process—to the potential good or ill of socially beneficial innovation. Given that modern innovation often takes place in group settings,⁴⁷ these insights promise to be particularly useful in advancing our understanding of how innovation progresses—or fails to—in the real world.

A. *How Psychological Accounts Help Explain Anti-Innovation Norms*

The research priority, methodology, and evaluation norms that become over-enforced and entrenched in innovative communities to the point of having detrimental effects on innovation do not arise in a vacuum. Like all social norms, they emerge as a result of the individual choices and behaviors of the people who make up the innovator groups that subscribe to them. But what causes these innovators to make these particular choices, even when they may be aware that they are not optimal? The well-documented status quo and conformity biases offer insights into how these norms might emerge and become entrenched in ways detrimental to innovation. Status quo bias, as the name suggests, is the empirically observed tendency of people to prefer and maintain the status quo even when it is suboptimal.⁴⁸ A host of practical and psychological explanations help explain why this is so. For example, there are transition costs associated with making a change, and the costs and benefits of a switch may not be fully understood in advance.⁴⁹ Add to this the fact that humans feel losses more deeply than gains and tend to work hard to avoid feeling regret and cognitive dissonance—an inconsistency of belief that can occur when one realizes that a past decision was in error—and one can begin to understand why the status quo so often persists in spite of the seemingly obvious (to outsiders) benefits of trying something new.⁵⁰

Although status quo bias operates fundamentally on the individual level, it can also help explain why certain social norms emerge and persist in a group setting. Consider, for example,

47. Bair, *supra* note 2, at 721.

48. William Samuelson & Richard Zeckhauser, *Status Quo Bias in Decision Making*, 1 J. RISK & UNCERTAINTY 7, 23 (1988).

49. *Id.* at 34.

50. *Id.* at 35, 38–39.

research priority norms that tether innovative communities to particular research questions and creative approaches, leaving them blind or antagonistic to other possibilities. For the individual within one of these communities, the cost of transitioning to a new agenda, coupled with the inherent risks of doing so and the desire to avoid loss—of career, status, or reputation—and its attendant regret, may very well overcome any desire to branch out. These sentiments can be amplified in a group setting, where an individual's successes and failures are not private but public. Additionally, the phenomenon of regret avoidance colors not only our own perception of risk but also our judgment of others' risk-taking behaviors. People tend to judge others' failures more harshly if those failures resulted from a departure from the status quo.⁵¹ And just as the desire to avoid cognitive dissonance often leads individuals to rationalize their own past behaviors to bring them in line with a belief in their own basic competence, making it more difficult to consider different options going forward; it also, in a group environment, provides a disincentive to changing course, lest others in the group interpret this action as an admission of previous failure. In a community setting, then, the very real fear of harsh judgment from others may compound an individual's personal reluctance to depart from established inquiries and approaches.

When these individual decisions, colored by group dynamics, are scaled up, they can result in an innovative community that hews closely to particular research and creative priorities. Each member of the group has invested significant resources of time and money in pursuing a particular set of priorities, and each has a psychological incentive to justify this investment by staying the course—and additionally, by policing other group members' behaviors in a similar way.

The same analysis could be applied to methodology and research evaluation norms. Group members who have spent their careers exploiting particular methodologies or adhering to particular standards of evaluation have psychological incentives to continue in the same vein and to ensure that others do so as well. To offer a simple example in the context of an evaluation norm, consider the scientific researcher who has dedicated significant time and effort in attempting (successfully or unsuccessfully) to get her papers published in a particular

51. See generally *id.* at 39 (discussing the phenomenon of risk avoidance).

prestigious journal. This researcher has clear incentives to maintain the journal's reputation and signaling role in the community and may act in various ways that forward this goal—for example, by encouraging young “superstar” researchers to publish there, or by emphasizing the importance of a publication in that journal in evaluation contexts like tenure votes—even if different ways of evaluating community members' work make more sense under changed circumstances.

In addition to status quo bias, the well-studied conformity bias offers additional insights into how research, methodology, and evaluation norms emerge and persist in innovative communities. The conformity bias is a common tendency for individuals to cede autonomous decision-making in some circumstances, choosing instead to adopt the behaviors of other members of a group to which they belong because other group members have adopted that behavior and for no other reason.⁵² The reasons why someone would choose such a course may seem inscrutable but are in fact quite understandable on closer inspection. One explanation is simply that conformity can serve as a decision-making heuristic or shortcut that harnesses the wisdom of the group. The logic is that if other members of a group to which one belongs and trusts are acting in a particular way, there must be “something to” that behavior—it must be beneficial, or at least not actively harmful.⁵³ Conformity thus offers a simple way to reduce decision-making costs in certain situations. A second is that people who belong (or aspire to belong) to a particular group use conformity as a way to signal their membership in that group. Humans form groups because group membership brings many benefits both physical and psychological, like physical protection, the ability to share resources and knowledge, an enhanced ability to achieve goals through collective action, a sense of self-worth and belonging, and a validation of personal belief.⁵⁴ Adopting a set of behaviors representative of a group is a simple way to gain and maintain group membership.

When we consider how research priority, methodology, and evaluation norms emerge and become entrenched in innovative communities, the individual drive to conform likely plays a role.

52. Bair & Pedraza-Fariña, *supra* note 3, at 1091, 1111.

53. See Julie C. Coultas, *When in Rome . . . An Evolutionary Perspective on Conformity*, 7 GRP. PROCESSES & INTERGROUP RELS. 317, 330 (2004).

54. See generally Donelson R. Forsyth, *The Psychology of Groups*, NOBA, <https://nobaproject.com/modules/the-psychology-of-groups> (last visited Sept. 1, 2022) [<https://perma.cc/ZB4A-54GQ>].

New entrants to innovative groups often—and often without much thought—adopt the research priority, methodology, and evaluation norms of the community. For example, a young research scientist in the field of, say, developmental biology who gains entry into the field through the traditional route of graduate school, a postdoctoral fellowship, etc. will commonly become interested in answering the questions the community has identified as interesting, using the methodologies common in her field. She will also almost certainly evaluate her and others' work by established community evaluation norms. Though there are many reasons why this is an unremarkable scenario, the conformity lens adds another layer of insight. From the perspective of reducing information costs, it makes perfect sense for the new entrant to harness the collective wisdom about what questions are the most pressing and what methodologies offer the most promising avenues for studying them rather than wasting valuable time that could be spent advancing one's career researching or developing alternative agendas or methodologies. It also makes perfect sense to accept the received wisdom about how to evaluate others' work—much more efficient, for example, to accept the community's conclusion that a particular journal publishes high quality work than to independently undertake an evaluation of particular outlets' publication standards. For a new entrant perhaps eager to be accepted into the developmental biology community, for example, these choices serve a signaling function as well, demonstrating that she will uphold the group's identity and values; that she is an effective researcher who will produce the kind of scholarship most valued by the community; and that she is therefore worthy of funding and advancement.

When you scale the individual group member's behavior to the population level, it is easy to see not only how these particular norms emerge in innovative communities but also how they can be difficult to overcome. Doing so requires one or more group members willing to do the hard work of independently reevaluating the collective wisdom—and either comfortable enough in, or apathetic enough about, their group membership to forego the signaling benefits adhering to this wisdom affords. And even if these individuals exist, they might still face an uphill battle as they deal with other group members who enjoy the benefits of membership and thus have strong psychological incentives to maintain group identity—incentives that may lead them to actively oppose any advances that threaten this identity or their

own place within the group. Innovation may thus not always proceed in the most beneficial directions as it contends with these other forces. The reality of this state of affairs is at least indirectly supported by a recent study showing that in the life sciences the death of an established prominent researcher in a particular field tends to be followed by a surge in new voices and highly influential research.⁵⁵ The thinking is that the deceased researcher, whether consciously or not, acted before her death as a particularly effective enforcer of group identity, making it harder, as one of the study's authors notes, for "outsiders to make a mark on the domain."⁵⁶

B. How Psychological Accounts Help Explain Pro-Innovation Norms

Although social norms, particularly when over-enforced, can have anti-innovation effects, social norms are not necessarily or uniformly bad for innovation. Indeed, much of the literature exploring social norms in the innovation context has celebrated how social norms can replace more formal legal systems (like IP) in providing innovation incentives.⁵⁷ Just as psychological accounts of behavior can help explain how innovation-inhibiting social norms emerge, so too can they shed light on the emergence of innovation-promoting norms.

One important way in which social norms seem to promote innovation is by deterring unauthorized copying of creative works. In the world of high cuisine, for example, exact copying of someone else's recipe is punished by other members of the community through shaming and shunning.⁵⁸ Preventing unauthorized copying by enforcing social norms arguably achieves the same goal as a more formal exclusivity regime such as IP: it preserves incentives to be creative by preventing the free riding that lowers the cost of creative goods, thereby allowing aspiring creators to recoup their creative investment. Somewhat counterintuitively, a social norm that accepts, rather than punishes, copying can also

55. Pierre Azoulay et al., *Does Science Advance One Funeral at a Time?*, 109 AM. ECON. REV. 2889, 2909 (2019).

56. See Peter Dizikes, *New Science Blooms After Star Researchers Die, Study Finds*, MIT NEWS (Aug. 29, 2019), <https://news.mit.edu/2019/life-science-funding-researchers-die-0829> [<https://perma.cc/MXW9-H8YG>].

57. See Bair & Pedraza-Fariña, *supra* note 3, at 1081.

58. Fauchart & Von Hippel, *supra* note 35, at 193–94; see also Oliar & Sprigman, *supra* note 36, at 1791 (describing a similar approach to the shaming and shunning seen in the culinary world in the context of stand-up comedians).

promote innovation. In particular communities like the fashion industry, it does so by speeding up the innovation cycle, giving rise to “induced obsolescence” for older innovations and creating markets for new creations.⁵⁹ Finally, scholars have pointed out that social norms encouraging attribution abound in many creative communities and can help promote innovation by providing nonpecuniary rewards to creators.⁶⁰

Looking to the psychology literature can help explain why these pro-innovation norms emerge and persist in innovative groups. As Greg Mandel has explored extensively, there are deep psychological underpinnings to human instincts about copying of others’ ideas. As he has pointed out, psychology studies have shown that children as young as six level moral approbation at those who plagiarize others’ work—a perception that persists in many cultures into adulthood. Children also judge the contribution of an idea to a project as more valuable than the contribution of mere labor, suggesting an early recognition of the unique value of idea generation.⁶¹ Indeed, many people erroneously believe that the purpose of IP is to prevent plagiarism—copying without attribution—rather than the broader, utilitarian-focused prohibition on copying IP imposes.⁶²

These individual psychological instincts about unattributed copying help explain the emergence of social norms that discourage it in various creative communities. Social norms often arise because individual group members take self-interested actions which are then multiplied at the group level.⁶³ In creative communities, people who stand to profit monetarily and reputationally from their creations certainly have an incentive to prevent others from copying their work; the psychological aversion to unattributed copying adds moral weight to these self-interested instincts and helps ensure that the norms are enforced on the

59. Kal Raustiala & Christopher Sprigman, *The Piracy Paradox: Innovation and Intellectual Property in Fashion Design*, 92 VA. L. REV. 1687, 1722 (2006).

60. See Fauchart & Von Hippel, *supra* note 35, at 193; Bair & Pedraza-Fariña, *supra* note 3, at 1127.

61. Gregory N. Mandel, *The Public Perception of Intellectual Property*, 66 FLA. L. REV. 261, 306 (2014); see Kristina R. Olson & Alex Shaw, *No Fair, Copycat!': What Children's Response to Plagiarism Tells Us About Their Understanding of Ideas*, 14 DEVELOPMENTAL SCI. 431, 438 (2011).

62. See generally Gregory N. Mandel et al., *Intellectual Property Law's Plagiarism Fallacy*, 2015 BYU L. REV. 915 (discussing the findings of a survey questioning laypeople's understanding of the purposes of IP).

63. Richard H. McAdams, *The Origin, Development, and Regulation of Norms*, 96 MICH. L. REV. 338, 355–57 (1997).

group level, often through means—like shaming, shunning, and sometimes even physical violence⁶⁴—that have a distinctly retributive flavor.

Given people's strong moral intuitions against copying, from a psychological perspective, it is perhaps somewhat surprising that some creative communities—most notably, the fashion industry—have developed a norm acquiescing to it. But in this regard, the finding that social norms are also a result of individual group members acting in their own self-interest is informative. It could simply be in the fashion industry that group members have recognized the benefits accruing from a culture of acquiescence to copying—a benefit that takes the form of faster fashion cycles and, ultimately, more product sold. This very human psychological characteristic of self-interest could overcome any competing psychological aversion to copying and lead to a social norm where copying is accepted. Ultimately, it raises an interesting empirical question about how competing psychological tendencies interact with each other and with the particular circumstances of a creative group to give rise to group-specific norms.

Mandel's work looking at public perceptions of IP may also help explain why attribution norms arise in many creative communities. According to Mandel, it may not be copying *per se* that people find morally objectionable so much as *unattributed* copying.⁶⁵ In other words, attribution often “cures” any moral discomfort people may feel about copying another's work. Thus, depending on the needs of the group, norms may develop that focus on punishing unattributed or misattributed copying rather than all instances of copying. In fact, this is exactly what we see in high-end cuisine communities, where social norms are directed at curtailing only exact copying and misattribution.

IV. BENEFITS OF A MULTILAYERED APPROACH TO STUDYING INNOVATION

The above analysis illustrates some of the potential benefits of a more holistic approach to questions about how innovation occurs and how best to promote it. At the most basic level, introducing considerations of social context and innovator psychology provides a more realistic picture of innovation than

64. Fauchart & Von Hippel, *supra* note 35, 193–94; Oliar & Sprigman, *supra* note 36, at 1791, 1797.

65. See Gregory N. Mandel, *What Is IP For? Experiments in Lay and Expert Perceptions*, 90 ST. JOHN'S L. REV. 659, 673 (2016).

traditional (and necessarily simplified) neoclassical economic accounts. The added richness and complexity these additional perspectives provide should advance IP scholars' collective understanding of the innovative process and, ultimately, add nuance to their positive and normative accounts of innovation law and policy.

An increased awareness of scholarship in other fields—like sociology and psychology—relevant to the innovative process can also result in a productive conversation that minimizes wasteful crosstalk. It allows IP scholars to take advantage of ideas that have perhaps, simply because they have only begun to turn their attention to them, been developed in more depth and sophistication elsewhere. Similarly, to the extent IP scholars engage in conversation with scholars from these other fields, the unique insights that arise from a study of innovation in the IP context can shed light on and provide helpful examples for these other fields as well. In almost all cases, the generalizability of particular concepts and findings is enhanced, thereby deepening and broadening the collective knowledge base. For example, our above explication of anti-innovation norms is consistent with existing narratives in the broader law and social norms literature that describe how self-interested actions of group members can lead to socially harmful group norms. While the socially harmful effects of norms are widely known and studied in this literature, innovation scholars have taken a more celebratory tone towards norms and have been slower to recognize how social norms could have harmful effects in the innovation context. Our description both draws from the broader insights of generalized functionalist models in the law and social norms literature and provides a specific example of how the model likely plays out in a real-world innovative community.

The translational approach demonstrated here also has very real implications for empirical work in IP—an increasingly important category of IP scholarship. For one thing, a heightened awareness among IP scholars of existing empirical literature in the social sciences can prevent unnecessary reproduction of well-established empirical findings. But even if reproduction is warranted to address questions unique to the IP setting (as it may often be), an understanding of the relevant empirical literature in other fields can offer important context that informs and strengthens both the experimental design and interpretation of results in IP-focused scholarship.

Second, translational research serves an important hypothesis-generating function that can influence the kinds of empirical questions IP scholars ask and answer. Some recent empirical work in IP illustrates this point. Mandel and colleagues' empirical work investigating public perceptions of the purpose of IP, for example, builds from existing psychological research detailing people's moral aversion to unattributed copying.⁶⁶ And Buccafusco and Sprigman's work empirically identifying a "creativity effect" in IP builds on behavioral psychology's previous identification of an endowment effect.⁶⁷

V. FUTURE DIRECTIONS

Our analysis in this Article raises a number of questions that could be explored empirically. We briefly discuss two sets of questions ripe for further empirical analysis that emerge from this translational exercise. The first set of questions concerns the relationship between psychological forces and their corresponding sociological manifestations. More specifically, if psychological forces primarily drive the social norms in particular communities, why do we see some variation among communities in the particular norms they adopt? How do other factors, like historical circumstances, network density (or cohesion), or path dependency, figure in? Are some creative communities, due to these circumstances, more prone to anti-innovation norms than others? Do particular psychological forces compete with each other in determining what norms will emerge?

A second crucial set of questions concerns understanding how marginal group members overcome the centripetal force of anti-innovation norms to collaborate with other community members—as well as the potential role of law and policy in this process. Two strands of research in sociology have bearing on this question.

First, sociologists have theorized different mechanisms that allow once-marginal problems to become mainstream. One strand of research emphasizes the role of "collaborative circles"—small groups of like-minded outsiders who, bonded through their common aversion to the dominant social norms, establish

66. See generally Olson & Shaw, *supra* note 61; Mandel et al., *supra* note 62.

67. See generally Buccafusco & Sprigman, *supra* note 46.

communities of resistance.⁶⁸ Trust and reciprocity in collaborative circles is thought to play an important role in insulating their members from the centripetal force of the main group's social norms. Another related line of inquiry takes social movement scholarship to examine how marginal ideas (perhaps originated in a collaborative circle) can eventually become accepted by core group members.⁶⁹ Yet another theoretical perspective studies how two or more communities "trade" across boundaries.⁷⁰ Analogizing the interaction between two scientific or artistic communities to the process of trading has been a particularly fruitful way to understand collaboration between communities with different research, methodology, and evaluation norms. Mediated by hybrid or "creole" languages⁷¹ and "interactional" forms of expertise that seek to translate knowledge from one community to the other,⁷² these "trading zones" are a promising theoretical construct for IP scholars who want to understand how innovation emerges from community interaction.

Second, a quantitative network literature has identified a particular structural signature (a "structural fold") that facilitates fruitful collaboration across group boundaries leading to truly innovative ideas.⁷³ Structural folds are characterized by "intercohesion"—"a distinctive network structure built from intersecting cohesive groups."⁷⁴ Put differently, structural folds bring together overlapping groups with *both* large cognitive distances (i.e., diversity of thought) and reservoirs of trust among at least some group members who are linked by strong ties.⁷⁵

Understanding how marginal group members reach across boundaries to collaborate with "outsiders" has implications for law and institutions. Recent studies in our current innovation ecosystem have emphasized how women and minorities are underrepresented not only in STEM fields but also in the

68. MICHAEL P. FARRELL, COLLABORATIVE CIRCLES: FRIENDSHIP DYNAMICS & CREATIVE WORK 14 (2001); John N. Parker & Ugo Corte, *Placing Collaborative Circles in Strategic Action Fields: Explaining Differences Between Highly Creative Groups*, 35 SOCIO. THEORY 261, 265 (2017).

69. John N. Parker & Edward J. Hackett, *Hot Spots and Hot Moments in Scientific Collaborations and Social Movements*, 77 AM. SOCIO. REV. 21, 22–23 (2012).

70. See PETER GALISON, IMAGE AND LOGIC: A MATERIAL CULTURE OF MICROPHYSICS xxi (1997).

71. *Id.* at 42.

72. Collins et al., *supra* note 16, at 661.

73. Vedres & Stark, *supra* note 4, at 1157–58.

74. *Id.* at 1155.

75. De Vaan et al., *supra* note 4, at 1153–55.

community of patent-seeking inventors.⁷⁶ A multilayered approach to understanding and framing this problem would both identify potential anti-innovation norms that may discourage patenting by women and minority groups⁷⁷ and consider how legal infrastructure can facilitate the creation of collaborative circles or structural folds.

A third set of questions asks how community dynamics might differ depending both on the community in question and the degree to which an innovator is working either individually or communally within that community. For example, with regards to the type of community, we might ask whether social norms in corporate communities operate differently from academic communities. If so, how? With regards to the individual's role within that community, we might ask if the social and psychological forces outlined here operate differently depending on whether the innovation is conducted primarily individually within a larger community setting (like an artist or academic researcher who belongs to a community but undertakes the bulk of their work alone) or is conducted by a group (like a pharmaceutical research team working together to develop a new drug).

More broadly, the sociological and psychological literature tends to ignore the role of policy, law, and regulations—opening the door for fruitful empirical legal scholarship. For example, how do collaborative circles use patent or copyright law, if at all? How do they interact with legal, regulatory, and institutional structures designed to regulate innovation (grant-making agencies, technology-transfer offices at universities, the Patent and Trademark Office, the Copyright Office, among others)? What is the role of targeted grants, such as the interdisciplinary NIH grant that allowed for the emergence of the Oncofertility Consortium, in fostering collaboration across borders? When is a single, short-term grant sufficient to overcome anti-innovation norms? What other factors are required to successfully spur collaboration across boundaries? Finally, from a policy

76. See, e.g., Jennifer Hunt et al., *Why Don't Women Patent?* 1 (Nat'l Bureau of Econ. Rsch., Working Paper No. 17888, 2012); Jyoti Madhusoodanan, *Why Do Women Inventors Win Fewer Patents?*, YALE INSIGHTS (Apr. 9, 2018), <https://insights.som.yale.edu/insights/why-do-women-inventors-win-fewer-patents> [<https://perma.cc/QZ9B-729A>]; Thomas J. Misa, *Gender Codes: Defining the Problem*, in GENDER CODES: WHY WOMEN ARE LEAVING COMPUTING 3–5 (Thomas J. Misa ed., 2010).

77. See generally Nathan Ensmenger, “Beards, Sandals, and Other Signs of Rugged Individualism”: Masculine Culture Within the Computing Professions, 30 OSIRIS 38 (2015) (discussing masculine anti-innovation norms and cultural barriers that women faced within computing professions beginning in the 1960s).

perspective, what infrastructures facilitate—and which ones hamper—processes of community formation?

VI. CONCLUSION

Sociological and psychological approaches to innovation have much to offer IP scholarship, and law and innovation scholarship more broadly. In this Article, we described two sociological accounts of innovation that we consider particularly relevant to law and innovation scholarship. First, analyses centered on the science and technology studies tradition that seek to demonstrate how the direction and content of innovation is deeply influenced by its social context. Second, analyses emerging from quantitative network studies that seek to identify those network structures that lead to particularly creative, breakthrough innovation. These two lines of inquiry emphasize the importance of shifting our unit of analysis from studying the motivations of individual inventors to understanding the types of community social norms that bind those individual inventors and influence the types of problems they focus on and the tools they use to solve them. Crucially, because breakthrough innovation often requires the formation of teams across community boundaries, these sociological perspectives also forefront the importance of understanding the twin processes of boundary-maintenance and disruption.

Of course, all group processes can ultimately be traced back to a series of linked individual decisions. Moving away from a conception of the individual inventor as a lone genius divorced from a group also allows for a renewed focus on the types of psychological biases that social psychologists and behavioral economists have uncovered in the past five decades—biases that enable the emergence and maintenance of community social norms. Adopting the type of multilayered approach that we outline in this Article opens the “black box” of innovation to law and policy interventions. The view that emerges regards innovation as an iterative, relational, and fundamentally social process. Understanding how that social process unfolds—including by understanding how individual psychology interacts with sociological processes—is crucial to designing effective law and policy interventions to foster welfare-enhancing innovation.