BRIDGING OLD WORLDS AND BUILDING NEW ONES:

TOWARDS A MICROSOCIOLOGY OF CREATIVITY

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Abstract

This chapter argues that creativity remains an elusive construct because, in action, it entails two distinct, concurrent, yet often opposing processes that embed an individual within their particular social context: *bridging* and *building*. On the one hand, creativity requires bridging multiple worlds—recognizing patterns and connections between previously unconnected ideas often across distinct contextual domains (Hargadon, 2002; Weick, 1979). On the other hand, the creative process requires building new patterns of understanding and action within those social groups that serve as arbiters of the creative output (Csikszentmihalyi, 1988). Without the initial recognition of new patterns and possibilities, creativity lacks the defining Aha! Without the subsequent changes in understanding and action across larger communities, the creative inspiration passes unnoticed. To explicate these two processes, this chapter uses the perspective and literature of microsociology, which is concerned with how an individual's social surrounds both constitute and constrain their understandings and actions.

TOWARDS A MICROSOCIOLOGY OF CREATIVITY

Why, after almost fifty years of focused study, does creativity remain so elusive yet fascinating a topic? There is no denying the valued role creativity plays in spurring individual, organizational, and social change. But after half a century's effort we are little closer to prescribing the process. In Greek mythology, the Chimera is a fire-breathing monster with a lion's head, a goat's body. One reason for creativity's continued allure, this chapter suggests, is that it is a chimera. Not in the first sense, as a figment of the imagination or wildly unrealistic idea, but in the second, as an organism made of two completely different genetic materials. Its vainglorious lion's head reflects creativity as an intensely personal process of deviating from the conformity of shared custom and culture, of rebelling against a tradition-bound social system. Its humble goat's body reflects a backstage process that is intensely social, rooted in established social systems and ultimately seeking acceptance within those systems for its own set of ideas. To explore this tension between the personal and the social, between front stage defiance and backstage dependence, this chapter introduces the perspective of microsociology, which is concerned with understanding how individuals are shaped by and in turn shape their social surrounds.

Creativity involves the generation of novel, valuable, and non-obvious solutions (Amabile, 1983, 1988). It is a process that Jevons (1877, in Albert & Runco, 1999: 25; see also Becker, 1995) eloquently called the "divergence from the ordinary grooves of thought and action," and reflects our appreciation for the difficulty of breaking free from the bounds (cognitive, emotional, and behavioral) of socially shared conceptions of what

is appropriate or even possible. Albert Szent-Gyorgi describes the process as "seeing what everyone else has seen and thinking what no one else has thought."

At the same time, however, creativity is a social process that initially constructs solutions from pieces of the known world and ultimately depends on the approval of audiences in that world. In the original conception, paraphrasing E. H. Gombrich (1961), there is no such thing as the immaculate perception. All perceptions and the actions they inspire are built upon existing understandings and the construction of creative solutions, as Weick (1979: 252) argues, involves "putting new things in old combinations and old things in new combinations." And once an idea has emerged, it still awaits the judgment of a particular audience before it becomes creative: "Creativity is not the product of single individuals, but of social systems making judgments about individuals' products" (Csikszentmihalyi, 1999: 314). These judgments are far from detached—they are reflections of the extent to which others within the social system converge around the new ideas.

We measure the creative value of works by Albert Einstein, Pablo Picasso, or Martha Graham, for instance, by some intuitive combination reflecting their deviation from what came before and the convergence that followed. While the former process involves a sort of social deconstruction, a taking down of established thought and action, the latter involves social construction, the building up of new thoughts and actions first by an individual or small group and later by the larger social system. These processes firmly place creativity in the relationship between the individual and society. First, for how the individual diverges from ordinary thought and action and, second, for how such divergence shapes and is shaped by the social context. A useful way to examine the

interplay of these two processes is from the theoretical perspective of microsociology, and this paper applies such a perspective to the creative process across a range of different contexts, from science to business to the performing arts.

A Microsociology of Creativity

A microsociological approach has much to offer the study of creativity. Sociology's enduring question asks how individual behavior can be both consequence and cause of the larger social order. Microsociology is essentially concerned with a social theory of the mind. As a tradition, this focus originated with the work of the American Pragmatists Charles Pierce and William James in the 19th century and continued through Charles Horton Cooley, John Dewey, George Herbert Mead, Harold Garfinkel, and Erving Goffman (for a historical review, see Collins, 1994). [1] Microsociology focuses on how the social manifests itself not in external institutions but in constructing the individualized representations of those exterior institutions and on how those representations shape comprehension and action.

Like modern psychology, a microsociological approach is concerned with how individuals comprehend their situations and craft responses. Unlike cognitive psychology, microsociology gives primacy to social structure and context; unlike social psychology, microsociology addresses a social structure and context that extends far beyond the immediate and local. Charles Peirce's original formulation was that man is "simply the sum total of his thoughts, and this sum is always a historical bundle of his society's experience." (Collins, 1994: 252).

[1] While this tradition has spawned the fields of ethnomethodology and symbolic interactionism, this paper takes an approach more akin to Goffman's attendance to the interaction between social stucture and cognition (e.g., Goffman, 1974).

From a microsocial perspective, an individual's social surrounds shape their thought and action by constituting (and simultaneously constraining) individuals to a range of definitions for a given situation and the appropriate responses available (Barley & Tolbert, 1997; DiMaggio, 1997; Friedland & Alford, 1991; Goffman, 1959). As Goffman (1974: 2) states,

> A 'definition of the situation' is almost always to be found, but those who are in the situation ordinarily do not create this definition, even though their society often can be said to do so; ordinarily all they do is to assess correctly what the situation ought to be for them and then act accordingly.

To describe this constitutive nature, sociologists have variously used the language of frames, logics of action, cultural tools, and schemas and scripts (Barley & Tolbert, 1997; DiMaggio, 1997; Friedland & Alford, 1991; Goffman, 1974); acknowledging similar work within the field of psychology, this chapter adopts the use of schemas and scripts (Schank & Abelson, 1977). DiMaggio (1997: 269) defines schemas as "knowledge structures that represent objects or events and provide default assumptions about their characteristics, relationships, and entailments under conditions of incomplete information." Scripts, as more localized forms of schemas, direct individual action and understanding within highly particularized situations (Barley, 1986; DiMaggio, 1997). The presence of schemas helps us to see; the presence of scripts, to act. Most importantly for our purposes, schemas and scripts represent the means through which understanding and action are embedded within established social worlds—individual cognition serves as the nexus between institutions and action.

Applying a microsocial perspective to the study of creativity shifts the focus away from the novelty of a creative solution—the extent to which an idea diverges from ordinary thought and action—and towards the ways in which that divergence is

constructed from pieces of existing thought and action. People create novel insights by importing and recombining schemas and scripts learned in other contextual domains—in other words, people don't think out of the box, they think in other boxes (Hargadon & Fanelli, 2002). Psychologists, sociologists, economists, and historians have long recognized creativity as a recombinant process. Bethune (1837) considered it the ability to "originat[e] new combinations of thought" and William James (1880) called it "the most unheard-of combinations of elements" (in Albert & Runco, 1999: 25-26; see also Becker, 1995). Similarly, the technological historian Usher (1929: 11) described innovation as the "constructive assimilation of pre-existing elements into new syntheses," and sociologist Ogburn (1922; in Basalla, 1988: 21) defined it as a result of "combining existing and known elements of culture in order to form a new element." Consider the following examples:

- Henry Ford didn't invent mass production but rather gathered together elements of technologies that had developed, some for almost a century, in other industries. In armory production he found the technologies of interchangeable parts; In canneries, granaries, and breweries he found the technologies of continuous flow production; In the meatpacking plants of Chicago, the assembly line; And in the emerging electric industry, the electric motor (Hargadon, 2003; Hounshell, 1984). Ford (Gordon, 2001) once even testified:

> I invented nothing new. I simply assembled into a car the discoveries of other men behind whom were centuries of work… Had I worked fifty or ten or even five years before, I would have failed. So it is with every new thing.

- Polymerase chain reaction (PCR) is the biochemical process that enables the replication of single strands of DNA in great quantities. As such, PCR underlies the recent biotechnology revolution (Rabinow, 1996). Kary Mullis once described his achievement:

> "I put together elements that were already there, but that's what inventors always do. You can't make up new elements, usually. The new element, if any, it was the combination, the way they were used.

• In 1972, Ray Tomlinson wrote the first electronic mail application by combining the code of an existing *intra*-computer messaging application with an *inter*-computer file transfer protocol (Segaller, 1998). As Tomlinson describes:

> It seemed like an interesting hack to tie these two together to use the file-transfer protocol to send the email to the other machine. So that's what I did. I spent not a whole lot of time, maybe two or three weeks, putting that together and it worked.

• In 1953, Elvis Presley's first record, and hits, came by combining the lyrics and melodies of country music with the beat and energy of Rhythm and Blues. "Blue Moon of Kentucky" was a bluegrass standard, written by Bill Munroe, which through a series of recorded rehearsals can be heard transforming itself, combining with R&B rhythms to become a hybrid tune with a rocking beat. A decade later, the Beatles similarly made their start by combining American folk, R&B, and rockabilly. David Crosby, of the Byrds and later Crosby, Stills, Nash, and Young, described what the Beatles brought to Rock and Roll as a recombination of what had come before:

> I heard folk sort of changes with rock and roll sort of beat [in the Beatles music]. Now, most new musical forms are created that way, the synthesis takes place by two disparate streams of stuff hitherto unrelated being mushed together.

• Einstein developed a theoretical framework that combined existing understandings of what were previously unconnected ideas and phenomena. Einstein built on the ideas of Boltzmann, Hertz, Poincare, Mach, Planck, and others, but combined them in a way that enabled him to take what was best and leave behind the vestiges of their origins in older scientific practices and communities. As Gardner writes (Gardner, 1993: 114),

> Einstein's breakthrough was classic in that it sought to unify the elements of a physical analysis, and it placed the older examples and principles within a broader framework. But it was revolutionary in that, ever afterward, we have thought differently about space and time, matter and energy."

From a microsocial perspective, the origins of these creative acts lie in the same social structures, the same "ordinary thoughts and actions," that prevent most of us from being creative. Recombining existing ideas is possible because the ideas are drawn from a range of otherwise disconnected contexts—different worlds—and so appear new (and are new) to new audiences. Over time, these roots become obscured by the continued evolution of new combinations in new settings. The pre-existing elements of Ford's mass production—the machines, the people, and the ideas—quickly adapted to the new

surroundings. The Beatles quickly moved past the original combinations they created, placing their own original imprint on the evolution of Rock and Roll. Yet this does not diminish the critical role played by the continuity of their creative process. As the artist Nathan Oliveira argues, originality is an end rather than a point of departure (Keats, 2002).

The question remains: How is it that these existing elements constrain so many of us to the grooves of ordinary thought and action and yet enable others to construct from them radically new and different ideas and actions? Following earlier work which embeds creativity within a context of social networks (Hargadon, 2003; Hargadon & Fanelli, 2002), one explanation rests in how individuals relate to their social surrounds. Creativity remains elusive because it requires individuals to relate to the established social system in two different ways. In a language of social networks, creativity entails (1) bridging existing contexts to acquire and recombine existing thoughts and actions, and (2) building new communities around those new combinations in order to gain their acceptance. These are different processes. Bridging describes a network position (and path) that exposes individuals to a range of relatively different social situations because it involves building wide-ranging but weak relationships with others who are not themselves connected to one another. Building new communities around creative opportunities describes a network position (and path) that embeds individuals within a single community because it involves building strong relationships with and between others. Bridging different contexts enables individuals to acquire many new and different ideas, to break from existing frames, and to pursue independent thinking. Building new followings around novel ideas requires committing to a single or few ideas, to seeking the

acceptance of others, and in other ways pursuing the benefits of shared thoughts and actions. Taken together, the creative process requires the ability to rebel against existing ideas and yet wholly commit to a new one, the ability to scoff at existing customs yet ceaselessly promote your own.

Creativity's chimerical quality can be seen in the paradoxical constraints and opportunities posed by these different ways individuals relate to the surrounding social structure. Social structures reflect dense networks—not the simple social networks defined by network theory, but rather the webs of thought and action that tie individuals to the ideas and objects they experience in everyday life. These are the networks that Weber meant when he said "Man is suspended in webs of significance he himself has spun." In the larger landscape that encompasses many different communities, these dense networks show up as many small worlds only loosely connected to each other. We should view them as small worlds for two reasons. First because this is the way they are experienced. To someone on the inside, the world easily shrinks to encompass only those who they interact with on a daily and weekly basis, who occupy the same places, and share the same ideas. The second reason these are small worlds is related though academic. To network theorists, the label small world comes from the surprisingly short distances that connect so many, relatively isolated pockets of dense interactions. We are, on average, somewhere between three and five degrees, or links, away from anyone else in the world (Watts, 1999). That means everyone, on average, knows someone (one link) who knows someone (two links) who knows someone (three links) who knows anybody else (four links) in the world. This small world phenomenon is so surprising because we

are continually surprised when these latent connections are made apparent and the artificiality of our distance and distinctiveness are made clear.

Small worlds both enable and constrain action. The dense connections give any single world its structure and stability and, as a result, enable a complex set of people, ideas, and objects to work smoothly together as a single, coherent system. But these same dense ties also make it extremely difficult to change any one part of that system without affecting the rest. Consider what happened to the world that Ford built. The development of mass production at the Ford Motor Company shows the creative potential of finding new ways to use old ideas. And it shows how Ford managed to create an organization capable of pulling the best people, ideas, and objects from a range of otherwise distant and disconnected worlds. But in the decade after Ford had established mass production of the Model T, General Motors began a systematic strategy of dividing and conquering Ford's mass-market by introducing a range of mid- to low-cost models

Compared to the bold and experimental approach Ford took in manufacturing the Model T, his response to this new threat was stunning for its defense of the status quo. Rather than adopt the new marketing practices, Ford focused on what he knew best—lowering the cost of the Model T yet further. He had few options. With the River Rouge factory, he had constructed such a tightly linked manufacturing operation that any changes in the design of a part or process rippled painfully through the entire organization. The tight-knit relations between people, ideas, and objects that Henry Ford constructed around mass production and the Model T made it almost impossible to respond to General Motor's introduction of multiple models and annual design changes. Ultimately, the River Rouge plant, the pinnacle of Ford's system, had to shut down

completely for nine months to abandon the Model T and convert over to a new model. In short, Ford's success in piecing together a system of mass production sowed the very seeds of its failure—the inability to easily accommodate changes in particular elements.

From 1908 to 1914, Ford revolutionized mass production by recognizing the latent potential in bringing together the people, ideas, and objects of distant worlds. And he successfully built a new world around this new combination. The world he built, however, quickly became small—its inhabitants unable to change their thoughts and actions in response to the new and valuable possibilities that arose just outside its boundaries.

In a similar story, four years after Edison threw the switch at the Pearl Street Station in downtown New York, George Westinghouse opened a electric generating plant in Buffalo and began one of the most famous standards wars in technological history. Edison's system produced a low-voltage, direct current (DC) for transmission and use. In contrast, the new Westinghouse plant produced high-voltage, alternating current (AC). The arguments for and against each system are many and muddled—but simply put, the advantage of AC electricity lay in more efficient transmission over distances, the disadvantage lay in the complexities and danger of an undeveloped system. The Battle of the Systems, as it became known, was played out mainly in the press roughly from 1887 to 1892. In the end, Edison lost more than just the technical standard—he also lost his reputation as inventive genius. Passer once wrote, "In 1879, Edison was a brave and courageous inventor, in 1889, he was a cautious and conservative defender of the status quo" (in Millard, 1990: 101).

What happened in between? If we believe that creativity is a persistent individual quality—we're at a loss for explanation. But if we consider how Edison, like Ford, first relied on, and then explicitly abandoned a strategy of bridging the many small worlds, we can better understand such outcomes. In 1882, Edison announced: "the electric lighting system is now perfected. I will now bend all my time and energies to its introduction to the public." Despite Edison's usual hyperbole, in this he was telling the truth. He moved from Menlo Park into Manhattan, to be close to the business headquarters of Edison Electric light Company, saying "I'm going to be a business man, I'm a regular contractor for electric lighting plants and I'm going to take a long vacation in the matter of invention" (Millard, 1990: 3). Edison had turned his attention to building the necessary community around his emerging innovation but, in doing so, he burned his bridges to other worlds.

It's easy to single out a few individuals and groups that cannot let go of their old knowledge, refusing to see and adapt to breakthrough technologies that pushed them aside. But often it's the very same people who led the previous revolution. The transformation of both Edison and Ford from courageous inventors to defenders of the status quo reveals the paradox inherent in creativity. The skills required to bridge distant worlds and generate novel combinations are ill suited to the focused process of building new worlds around such innovations, and those skills required to build new worlds are ill suited to ranging widely in search of alternatives. The novelist Robertson Davies once wrote that knowledge "makes you wise in some ways, but it can make you a blindfolded fool in others." The difference, I would suggest, lies in the relations between individuals and their social systems.

The dense connections that make up small worlds do more than just make change costly—they actually make it difficult to recognize the possibilities for such change in the first place. The many strong and frequent interactions within any single world ensures that inhabitants are surrounded by other people who are doing the same things, sharing the same ideas, using the same objects. As Beach (1997: 25) writes in *The Psychology of Decision Making,* "people who share cultures often arrive at similar frames for situations, frames that might be very different from those arrived at by outsiders" or, as Cohen and Prusak (2001: 56) put it, the ties that bind are the ties that blind. Whether we draw the boundary of a small world around a group, and organization, or an industry, we must recognize that small worlds shape perceptions in ways that prevent inhabitants from seeing the value of people, ideas, and objects that reside outside of their traditional boundaries (Chatman, 1991; Chatman & Jehn, 1994).

Weick's (1993) study of the team of smoke jumpers who died when a fire turned against them shows the sometime tragic inability to value ideas and actions outside one's perceived context—and to recognize when one's context is no longer a valid interpretation (see Maclean, 1992). One cause contributing to their deaths was their inability to drop their tools during their retreat up a steep hillside, despite the fact those tools were now worse than useless. To these firefighters, both Maclean and Weick argue, those tools were more than simple objects, they represented who they were, why they were there, and what they were trained to do. Dropping their tools meant abandoning their existing knowledge and relationships. This may not seem such a hard choice to make, but because they had not been trained for such a moment, they had no alternatives models of behavior. In moments of uncertainty and danger, clinging to the old ways may

seem a better alternative than no ways at all. Even in more tranquil settings, people often fail to come up with new understandings of what's happening, new ways of dealing with problems, because they lack the wide ranging set of ideas from which to piece together alternatives.

BRIDGING OLD WORLDS

Bridging activities bring people into contact with the wide variety of well-developed technologies that already exist in other worlds. But bridging activities provide another critical advantage that can easily be overlooked. The act of bridging distant worlds actually changes the way people see and think about the people, ideas, and objects they come in contact with. In this way, bridging activities overcome the parochialism that hinders individuals, groups, organizations and even industries from seeing the value of people, ideas, and objects that reside outside their traditional boundaries.

Bridging old worlds offers a means for overcoming the perceptual blocks that typically hinder the creative process. These activities work for two related reasons. First, by moving through other worlds, bridging puts people in the flow of the many different thoughts and actions that reside within any one world. Second, bridging changes the way people look at not just those different ideas they find in other worlds, it also changes the way they look at the thoughts and actions that dominate their own.

At its heart, bridging activities provide the conditions for creativity, for the Eureka moment when new possibilities suddenly become apparent. But remember recombinant innovation. Creative insight, from this perspective, means seeing new ways to combine old ideas, not ignoring the past but exploiting it. Nowhere is the learning process of individuals and organizations more critical, or more misunderstood, than in

this creative process. The very notion that we can come up with new ideas has come under increasing attack by cognitive psychologists interested in understanding how people solve novel problems. A number of psychologists who have studied creativity, like Dean Simonton and Howard Gardner, for example, have argued that recombination is the fundamental mechanism behind creative insight. Einstein once said, such "combinatory play seems to be the essential feature in productive thought." And we can see Einstein's theory of relativity through the lens of recombination.

Einstein developed a theoretical framework that combined current understandings of what were previously unconnected ideas and phenomena, building on the ideas of Boltzmann, Hertz, Poincare, Mach, Planck, and others, but combining them in a way that enabled him to take what was best and leave behind the vestiges of their origins in older scientific practices and communities. Those closest to Einstein's discovery, the very individuals whose work Einstein recombined, Mach, Max Planck, Lorentz, Poincare, themselves never wholly embraced his work. Chance did not favor these very-prepared minds. Quite the opposite, each was *too* familiar with, and too committed to, what had come before to see how Einstein's new combination could be something greater than the sum of its parts. Max Planck referred to Einstein's theories as merely a generalization of Lorentz' work. And Einstein once said of Mach, whose work he admitted to closely building on, "It is not improbable that Mach would have discovered the theory of relativity, if, at the time when his mind was still young and susceptible, the problem of constancy of the speed of light had been discussed among physicists."

Simonton argues that these recombinant thought processes shape how people approach their environment. Those who are more engaged in exploring new combinations are often more attuned to the world around them:

> Those people who make their minds accessible to chaotic combinatory play will also make their sense more open to the influx of fortuitous events in the outside world. Both the retrieval of material from memory and the orientation of attention to environmental stimuli are unrestricted (Simonton, 1995: 470).

Rather than believing they have seen it all, or at least seen all that is worth seeing, those in the habit of finding unexpected connections begin to recognize in each new person they meet, each new idea they hear, and each new object they find, the potential for new combinations with others. The more worlds you bridge, the more you have a foot in each of these different flows, and the more you're able to see and exploit the existing technologies as they emerge and evolve in their own settings. But at the same time, having one foot in another world also means have one foot outside any one world. Having one foot outside your world means you can be less beholden to the ties that would otherwise bind, and blind, you in that world because you have somewhere else to go.

The trick seems to be developing in-depth knowledge within a given field while, *at the same time*, retaining the willingness to take that knowledge apart and combine it in new ways. This is difficult because, as the fire at Mann Gulch shows us, people are reluctant to abandon their old knowledge. Bridging distant worlds provides a way to acquire knowledge without acquiring the ties that typically bind such knowledge to particular worlds.

Einstein himself admits that his ability to revolutionize physics came not from his intellect but rather his position relative to others more deeply embedded in the field. He

did his most innovative work while on the periphery of the scientific community he overturned. As he once said of this position:

> Such isolation is sometimes bitter but I do not regret being cut off from the understanding and sympathy of other men…I am compensated for it by being rendered independent of the customs, opinions and prejudices of others and am not tempted to rest my piece of mind upon such shifting foundations (Gardner, 1993: 131).

In the same way, Elvis, who may have been no Einstein, also cut himself off from the "understandings and sympathies of other men" while growing up in Nashville, where he was accepted by neither the black community nor the white for his peripheral participation in each. We can give Einstein, Elvis, Edison, and Ford credit for seeing farther than others. But if we are truly interested in understanding the creative process, we need to think about how they bridged different worlds to get where they did and see what they saw.

BUILDING NEW WORLDS

Ralph Waldo Emerson's famous advice, "Build a better mousetrap, and the world will beat a path to your door," is misleading. The world tends not to beat a path to your door. As Hope (1996) describes, since the patent office opened in 1828 it has issued some 4400 patents for mousetraps and yet only 20 or so have made any money (the most successful, the spring trap, was patented in 1899). A better mousetrap, like anything else, succeeds only when those who envision the idea convince others to join in their new venture—as investors, suppliers, employees, retailers, customers, and even competitors—each of whom, in turn, contributes bring their own contributions and connections with them. The revolutionary impacts we see from creative efforts are often the result of the community that adopted the initial, well intentioned, but underdeveloped

ideas. Case in point, Emerson's now famous quote. In actuality, he never said that. The quote originated some seven years after Emerson's death. Emerson said "if a man has good corn, or wood, or boards, or pigs, to sell…you will find a broad, hard-beaten road to his house." Emerson was not talking about creativity but rather about selling a good product. It became so much more only when others joined in the process.

By a number of accounts, Edison was well aware of the need to sell his innovations to the public, to investors, to his employees, and to policy makers—and used his image as a creative genius to do so (e.g., Hughes, 1989; Nye, 1983). Once, the story goes, Edison met with a cub reporter who had come to interview the Wizard of Menlo Park:

> While the reporter was being ushered in, the Old Man disguised himself to resemble the heroic image of "The Great Inventor, Thomas A. Edison." … Suddenly gone were his natural boyishness of manner, his happy hooliganism. His features were frozen into immobility, he became statuesque in the armchair, and his unblinking eyes assumed a faraway look… (Hughes, 1989: 91)

Francis Jehl, Edison's long time assistant who joined him in Menlo Park and remained with him through most of his career, remembers when they first realized the power of Edison's name. At that point, he explained, they began the process of turning Edison the man into Edison the myth. To the public, Edison was an inventive genius. To Francis Jehl and many of the other engineers in that lab, "Edison is in reality a collective noun and [means] the work of many men."

The role of the collective in the creative process can also be seen in the early days of the impressionist movement in the 1860s. While history gives prominence to individuals artists—Renoir, Monet, and Cezanne—art historians have noted how these individuals began as a single, small group. Farrell (1982; 2001) recognized that these

collectives enabled the individual artists to commit to, and create, a movement that directly challenged the established art world. In splitting from the dominant styles of the art world, the artists' circle of early impressionists worked closely to develop their emerging style and to jointly construct an environment of support and motivation for their creative efforts. They worked so closely together that their paintings were often indistinguishable: when two paintings were on display in a gallery much later, Monet could not say which was his and which was Renoir's without looking to the signature. Only when the impressionist movement was established did each artist make efforts to distinguish themselves as individuals. Many such works of art, Farrell argues, and particularly those of the early stages of new movements should be viewed as the product of these collectives and not of any individual artist.

Collectives like Edison's Menlo Park team and the impressionists provide two critical resources in the creative process: a broader pool of ideas and a stronger network of support. The first, a broader pool of ideas, comes about because the collective brings individuals together in ways that allow them to build on each others' ideas, to turn a wacky comment or hesitant suggestion into a brilliant insight. The collective works when it becomes difficult, if not impossible, to identify whose idea it was in the first place. Farrell, in describing the early days of the impressionists, for example, explained how "A chance idea that might have been discarded if the painter had been alone was supported by the group. Risky decisions were validated and the group began to develop its own subculture…" (Farrell, 1982: 459) The project team that developed the Reebok Pump at Design Continuum was another such collective. When someone suggested putting an inflatable splint into a shoe, the others could have laughed it off as one more wacky idea

in a brainstorm filled with many wacky ideas. But instead, someone else built on their idea. The idea (and object) of an IV bag to act as the inflatable bladder made the idea of an inflatable splint not only realistic, but good (see Hargadon, 2002). Fundamentally, the difference between a good idea and a bad one, in a collective, depends entirely on what the others decide to do with it.

These early collectives also provide a common belief in their cause and its chances for success just when these are needed most, when the ideas (and people) are attempting to go against the established ways of doing things. The Asch (1951) experiments revealed the ineffectiveness of individual judgment in the face of social pressures to conform. However, Asch also found that the easiest way to enable somebody to resist the larger group was by giving them a small group of their own. Adding one more independent subject to the group—from one to two—makes the effect of the group pressures disappear. When subjects had one other person who agreed with them, they were able to stand against the larger group. Asch also found that this collective deviance was a fragile thing. Take one of the partners away in the middle of experiments, and the other often began conforming again.

In this way, collectives encourage individuals to think differently together. When you work with others who are visibly engaged in and passionate about their work, you feel better about it yourself. Emile Zola captures this power of collective deviance in his novel, *The Masterpiece*, which fictionalized his time spent working alongside the impressionists. When the central character, based on Monet, was in despair, he went walking with his friends:

> They… sauntered along, with an air of taking over the entire width of the Boulevard des Invalides. When they spread out like this, they were like a

> free-and-easy band of soldiers off to the wars… In this company and under this influence, Claude began to cheer up; in the warmth of shared hopes, his belief in himself revived.

In this group, each artists' motivation (and identity) was shaped by their connections with the collective.

We tend to think that organizations play the role of collectives, providing all the necessary support for those within. Beyond the small firm or new venture, however, this is rarely the case. The role of the collective is often more critical *inside* large organizations, where standard operating procedures and "the way we do things around here" make just about any change seem deviant, and where hierarchies can turn even casual comments by superiors into powerful pressures to conform. The role of the collective, joining forces to fight the status quo, often spells the difference between good ideas stopping at the first conservative layer of management or pushing their way, painfully if necessary, all the way to the top.

The collective helps by pulling together previously disparate people, ideas, and objects and providing them with the necessary support to overcome their initial illegitimacy. Once a new venture crystallizes and acquires legitimacy, an established community can emerge. Whether pulling individuals together from across different social groups organizations or within a single one, these communities take shape around emerging ideas such as the electric light or impressionist styles. As more and more people join, the community becomes more easily recognized from the outside. In organizations, it soon becomes officially sanctioned, maybe as a new development project, as a research center, or even as a new division. Outside of organizations, it begins to look like an emerging market (one of the most defining characteristics of the

evolving community being a readily identifiable set of customers), an industry, or a "cluster" of firms a located in a particular region. This transition from collective to community is the focus of research on the social construction of industries (Garud & Karnoe, 2001; Garud & Rappa, 1994; Van de Ven & Garud, 1993) and social movements (for a review, see Swaminathan & Wade, 2001).

Most of the actual improvements in productivity and performance of a new technology, like the steam engine, the electric light, the transistor, or the computer, take place *in use*—and long after "individual inventors" have lost control of their ideas to that communities that form around them (Gilfillan, 1935; Rosenberg, 1963, 1982). As communities grow around new technologies, they create the necessary feedback loops that sustain them. As one group gets better at manufacturing integrated circuits, another exploits those gains to design more advanced chips, and another uses those to develop better computers, which spurs the demand for more and better manufacturing.

DISCUSSION AND CONCLUSION

The two complementary creative processes detailed here, bridging old worlds and building new ones, reflect the recognition that creativity is an intensely personal and cognitive process that derives both its content and meaning from the surrounding social system. First, because the combinatory process that underlies creative insight draws its raw materials from the established schemas and scripts—thoughts and actions—provided by the institutional environment of the creative individual. And, second, because no matter how original the insight that results, the label of creativity still depends upon how many others are convinced to adopt and extend these original ideas. The ability to think

differently and then to convince others to think the same requires different and sometimes conflicting attitudes and behaviors.

Individuals can sometimes take on both roles. For instance, Edison developed a working light bulb, but then publicly announced his retirement from invention in order to pursue the acceptance of his new innovation. However, many creative efforts seem to overcome this paradox through dyads and small groups: Henry Ford relied heavily on Max Wollering and Walter Flanders; Steve Wozniak designed the circuits that Steve Jobs turned into a Computer company; Bill Gates worked closely with Paul Allen (and Steve Ballmer) from the beginning; John Lennon and Paul McCartney (and Sir George) formed the creative nucleus of the Beatles; Watson and Crick; Hewlett and Packard; Captain and Tenille. Even Edison established a partnership with Charles Batchelor, one of his engineers, which evenly split all patent royalties resulting from the work of the Menlo Park lab. Accounts describe how, when Edison was traveling, experiments at the lab continued, yet while Batchelor was away the experimentation ceased (Conot, 1979; Millard, 1990).

There is good reason to believe that we can all improve our creative abilities by attending to these different activities. First, we can seek a comfortable balance (unique for each of us) between the wide-ranging weak ties that enable us to bridge old worlds and the local, strong ties that embed us within a single world. More simply, we can seek out new people and new experiences or we can enjoy the comfortable rhythms of familiar context. Second, we can attend to shifting circumstances in the pursuit of our goals—at times it is better to bridge old worlds and at time to building new ones. And yet the process remains challenging. These opposing activities are difficult to balance and most

people, as Baker (2000) reports, end up favoring the local strong ties that provide community and continuity. Balancing between wide-ranging weak ties and local strong ties may be as difficult within groups, where the attitudes and interests of individuals reflect the different paths by which they arrived at this collaboration. The locals distrust the shallow experiences and non-committal "nature" of brokers; the brokers distrust the parochial and intransigent "nature" of the locals. And perhaps this is why creativity remains so fascinating, reflecting as it does such a momentary détente in the tension between the local and global, familiar and novel.

On the surface, the creative process takes awe-inspiring form as the source of revolutions in science, technology and the arts. And yet this lion's head appearance belies a more humble body of practice in which novel and valuable ideas are pieced together from existing ones, and in which the selling of new ideas must follow (or perhaps even precede) the anointing of those ideas as creative. This chimerical quality can distract from the intricacies of the creative process. This chapter has attempted to surface two of these intricacies, the influence of bridging, or moving between different worlds, and of building new worlds. The challenge remains to capture and study these influences more directly.

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