

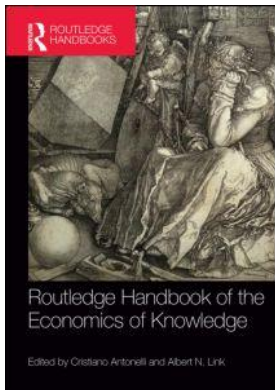
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Innovation and creativity

A slogan, nothing but a slogan

Benoît Godin

1. Introduction¹

If there is one basic idea that defines research and development (R&D) and technological innovation today, it is certainly that of creativity. But what is creativity? In a review article on the study of technological innovation among economists, Dominique Foray, the researcher responsible for the re-awakening of interest in the concept of a knowledge economy in the 2000s, states his intention to enlighten us on what economics ignores, in particular creativity. However, Foray is nothing if not frugal when it comes to providing a definition and analysis of what creativity is, except to state briefly that it is “l’aptitude à engendrer de la nouveauté, des nouvelles idées” (the aptitude to engender novelty, new ideas) (Foray, 2004: 246). To Foray, creativity is the “fruit du hasard ... et de la nécessité” (fruit of chance and necessity). It remains a mystery. In addition, Foray makes reference to two metaphors, including the Scrabble metaphor, to explain the combination and chance inherent in creativity. Furthermore, in a reminder of Schumpeter’s famous metaphor on “creative destruction” (Foray, 2004: 242), Foray discusses one half of the metaphor (destruction), but the second (creativity) not at all. Foray concludes: “jusqu’à présent, l’analyse économique de l’innovation n’a pas porté très loin”; the study of creativity is “un domaine encore en friche” (up to the present, the economic analysis of innovation has not led very far; the study of creativity is a realm still fallow) (Foray, 2004: 272). Foray’s analysis is itself a perfect example of state of the art.

Such a cloud surrounding the idea of creativity is also found with the economic historian Joel Mokyr, incidentally also author of a book on the knowledge economy (Mokyr, 2004). In *The Lever of Riches*, which bears the subtitle *Technological Creativity and Economic Progress*, Mokyr defines “technological creativity” as “the application of new ideas to production” in industry (Mokyr, 1990: 263).² As with Foray, we find in Mokyr a reference to Schumpeter’s metaphor. However, the author also concentrates his analysis on the destructive dimension of innovation without discussing creativity (Mokyr, 1990: 261–69). Having defined creativity as he does, Mokyr could reply that creativity constitutes the subject of the book as a whole. However, the definition of creativity that Mokyr provides is what others simply call innovation – and what others again, including Mokyr, discuss as *technological change*. Without further analysis of creativity itself, we must conclude that there is a circularity in the concepts.

Let's end this reflective introduction with a third author. I choose and critique Norbert Alter on this point because *L'innovation ordinaire* (Alter, 2000) is, I believe, an example to be followed when it comes to analyzing innovation. It includes an analysis of innovation that is empirical rather than strictly conceptual. "Creative" is a recurring term in Alter, and also appears in a chapter title (*Les processus créateurs*).³ However, Alter never defines the concept. We find a distinction between invention and innovation (Alter, 2000: 8), another between innovation and change (Alter, 2000: 119), but no definition of what creativity is. We understand that Alter uses the concept for "emergence of newness", but we find no analysis of creativity.

In brief, creativity is more postulated than studied, at least in science, technology and innovation studies. Creativity is simply a synonym for change and newness. The concept possesses a mythic value. When you have said the word, you have said it all. The above three stories are an exact copy of Joseph Schumpeter in *The Creative Response in Economic Theory*:

Whenever the economy or an industry or some firms in an industry do something else, something that is outside of the range of existing practice, we may speak of *creative response* [Schumpeter's italics] ... A study of creative response becomes coterminous with a study of entrepreneurship ...

(Schumpeter, 1947: 222)⁴

This chapter presents a contribution to the intellectual history of innovation, or the history of the concept of innovation. It attempts to explain how the concept of creativity came to be associated with the idea of innovation, creativity coming to define, to some, what innovation is. This chapter differs from what I have written in recent years on innovation. I conduct no archaeology nor genealogy of the concept of innovation in order to study its construction, the associated ideas or concepts and the authors who have contributed to the development of the representations. Space does not permit. This chapter attempts rather to provide an essay that draws freely on my current research into the intellectual history of innovation. In addition, I offer in conclusion some critical thoughts that I am not in the habit of including in historiographical writings.

2. A few words on history⁵

Innovation is everywhere, in the world of things – novelties of all sorts emerged continuously – but also in language, whether scientific or ordinary speech. Discussions on innovation occur every day, turning the concept into a cliché. The scientific literature is full of writing about innovation. In every country, public policies make innovation an instrument (a panacea) of economic policy.

But what is innovation? What is the origin of the concept, and could this origin have had an impact on our current representations and the uses that are made of the concept? The concept of innovation has its origins in antiquity. It goes back to the metaphoric use of a Greek term (*kainotomia*), which means literally to make new cuts, such as opening new galleries in the mines (Xenophon). Thereafter, innovation was used by philosophers within the framework of discussions on governments and changes of political constitutions. Innovation was then understood as the introduction of a change into the established order (Plato, Aristotle, Polybius). The Romans made a similar use of the concept (*novare*).

Innovatio entered the everyday vocabulary in the context of the Reformation (*in + novare*). In the sixteenth and seventeenth centuries, the English Puritans were responsible for one of the first controversies regarding innovation, using the term abundantly against their opponents. Bishops were accused of innovating in wishing to subtly integrate elements of Catholicism into

Protestant doctrine. Then in the eighteenth century, the concept came to be associated with political revolutions and, incidentally, with violence. Starting in the 1830s, it was the socialists' and social reformers' turn to be treated as (social) innovators because they overthrew the social and economic order. Innovation's pejorative connotation would endure until the twentieth century. The innovator is a deviant, and that includes innovators in the fields of science and industry (technology).

It is in the aftermath of the French Revolution, and of that period called *Sattelzeit* (1750–1850) by Reinhart Koselleck, that the concept gradually acquired a positive connotation. However, it is in the last 50 years that the concept was transformed into an ideology, and by the same group that had previously contested it: governments. Since the sixteenth century, governments have prohibited innovation by royal decree. Today, to governments, and supported in this by theorists, innovation, understood as technological innovation, has become an instrument of economic policy. Innovation is everywhere valued. The scientific literature is no exception: the vocabulary on technology is becoming that of technological innovation; biologists talk of animal innovation; sociologists resurrect the concept of social innovation, a concept that had appeared at the beginning of the nineteenth century.

Innovation's rehabilitation, and the related change in meaning, makes use of a rhetoric that replaces that relating to deviance (heresy, revolution). Two arguments have developed to this end during the past two centuries. The first relates to economics, in the broad utilitarian sense: innovation, provided it is "useful", is from then on not only welcomed but even sought after. The second argument relates to creativity: innovation is a creative activity, creative (in the productive sense) of economic value certainly, but creative also in the sense given to it in the arts (originality).

I suggest that it is by means of the idea of composition or combination that creativity made its entry into the vocabulary of innovation, beginning in the late nineteenth century. Innovation is the combination of existing elements with the goal of producing something new. In turn, the idea of combination, and this is the second contribution of this chapter, owes its origins to philosophical theories relating to the association of ideas in the eighteenth century.

If, however, as I mentioned above, there are two logics that contributed to the rehabilitation of the idea of innovation, it is the economic one that has prevailed over the "cultural" logic. This is the central idea of this chapter. For this reason, creativity, a concept with a "cultural" connotation *par excellence*, remains a word, nothing but a word – at least with regard to analyzing technological innovation. Creativity has become a metaphor, and the association between creativity and innovation has become a slogan.

3. The association of ideas

The epistemological question is at the heart of philosophical discussions of knowledge in the seventeenth and eighteenth centuries. How do we explain knowledge? If our senses trick us so often, and the mind, due to its capacity for imagination, falsifies our representation of reality, what is true knowledge? The doctrine of the association of ideas is the (or one) answer to that question.

In his *Essay Concerning Human Understanding* (1690), John Locke suggests that the mind constructs ideas from simpler ideas. The mind actively associates simple ideas (arising from perception) to produce complex ideas, and this, according to Locke, *ad infinitum*. This is the theory that would become known as the doctrine of the association of ideas. The expression does come from Locke.

To Locke, however, but also to Thomas Hobbes before him and David Hume after him, the association of ideas is pure fantasy. It is too often a source of error, particularly if the associations

are not “natural” (necessary). Associations are the fruit of education and of habit. Among the associationists there is no question of creative imagination, with few exceptions. The association is automatic: it occurs unconsciously. It is the memory that does the work. The imagination is only a passive faculty.

In fact, at the time, imagination is contrasted to reason. The imagination certainly produces newness, but it must do so according to strict rules. Association must be under the control of reason. A consistency should guide the association: similarity, proximity or succession (in time and space) and causality. Between simple ideas (sensation) and complex ideas, there must exist reasoning.

The psychological doctrine of the association of ideas had many followers in the eighteenth century among philosophers and other thinkers who were trying to explain knowledge (Warren, 1921; Kallich, 1970; Rapaport, 1974). “Associate, compose, combine, merge, unite”, these are just some of the terms regularly used to explain knowledge. The analogy with physics and chemistry (matter is a compound of elements) and with linguistics (words are the components of sentences) is also frequently heard among the associationists. However, it is as a result of literary criticism that association acquired a real legitimacy. From then on, the imagination (of the artist) was defined in a positive way. The imagination uses association or combination to create something new.

4. Combination

Imagination as a category remained fundamentally pejorative in the eighteenth century, and to many, long after that. The imagination is spoken of using synonyms like fantasy and fancy: the imagination invents (fictions). When philosophers have a good word to say about imagination, it is that it is said to be “active” – but still not creative. The imagination makes the required associations or plays a transcendental role (in the Kantian sense) that reflects the distinction or dichotomy between fantasy and imagination.⁶

Then, beginning at the end of the eighteenth century, the imagination acquired its stamp of nobility. The imagination produces newness, that is, it is creative. What had previously been a distortion of reality became embellishment of nature, deepening of things, interior truth revealed, creation. From then on there is postulated a distinction between reproductive imagination (memory) and productive imagination. This story has long been known (Bundy, 1927; Bowra, 1950; Abrams, 1953; Rossky, 1958; Engell, 1981). What I would like to emphasize here is the relationship between the idea of the imagination understood as creativity and the doctrine on the association of ideas (Mednick, 1962; Engell, 1981). To Locke, we have said, the mind associates or combines simple ideas to produce more complex ideas. Similarly, the imagination combines ideas and facts for producing something new. This combination is often described by analogy with the doctrine on the association of ideas.

The *Encyclopédie* of Diderot and d’Alembert (1751) is a good example of a conception of the imagination understood as combination. In the article on the imagination, Voltaire distinguishes passive imagination and active imagination, a dichotomy very popular at the time. The former is a simple reproduction (memory) of what the senses perceive, while the active imagination arranges: it “rapproche plusieurs objets distants, elle sépare ceux qui se mêlent, les compose & les change” (it brings together several distant objects, it separates those that go together, arranges them and changes them). Pour Voltaire, les “perceptions entre par les sens, la mémoire les retient, l’imagination les compose” (the perceptions enter via the senses, the memory retains them, the imagination arranges them).

Diderot, Condillac, Helvétius and several others espouse a similar conception. Even those to whom the imagination is not a positive faculty discuss it in terms of combination. Francis Bacon,

for example, suggests in *The Advancement of Learning* (1605) “The imagination, being not tied to the laws of matter, may at pleasure join that which nature hath severed and sever that which nature had joined, and so make useful matches and divorces of things”.

But let us be clear. Imagination is not yet a question of “creativity”. To Voltaire, the imagination does not create; it only arranges “car il n’est pas donné à l’homme de se faire des idées, il ne peut que les modifier” (as it is not given to man to make ideas, he can only modify them). Rather, we owe the connotation of the imagination taken as creative production or combination to literary criticism (Romanticism) – Addison, Wordsworth and Coleridge to speak only of the English, as it is in England (and Germany) that Romanticism is most productive on this topic – and to Kant and German idealism (Fichte, Schelling).⁷ To Coleridge, the imagination is a force or power of composition (a “synthetic power”). The imagination creates more than it associates. To idealism the imagination produces a transcendental synthesis of perceptions and consciousness. Alexander Gerard, in his *Essay on Genius* published in 1756, is a good example of the conception of imagination as combination too. To Gerard, genius is imagination, and the latter is essentially a matter of combination (association).

The conception of the imagination understood as combination has been influential: it developed in the eighteenth and nineteenth centuries and remains present in the literature of the twentieth century. This conception is found in particular in psychological theories or theories of a psychological nature. To Théodore Ribot, in *L’imagination créatrice*, imagination is a matter of association (Ribot, 1900). To the psychologist Robert Woodworth, who doesn’t hesitate to refer to the doctrine on the association of ideas, the imagination is a mental “manipulation” that combines previously perceived facts into a new product (artistic, technological, social). The imagination rearranges in order to produce newness (Woodworth, 1929). Some decades later, Arthur Koestler invented the concept of “bisociation”: “combining two hitherto unrelated cognitive matrices in such a way that a new level is added to the hierarchy, which contains the previously separated structures as its members” (Koestler, 1967: 213–15).

The conception of the imagination seen as combination is also that of invention. In fact, the two concepts have often been a pair since the eighteenth century. Invention as genius or ingenuity (*ingenium*) is a highly creative ability that gathers, collects, rediscovers and borrows from what exists in order to produce something new. The concept of invention, of rhetorical origin, thus takes on a connotation related to originality and to (free) creation (Smith, 1925; Nahm, 1973–74).⁸ In every field, invention would thereafter refer to a creation and would be discussed in terms of combination. In the article on Art in the *l’Encyclopédie*, inspired by Bacon, Diderot suggests that complex machines are the combination of simpler machines. The idea is present as well in Adam Smith, Jean-Baptiste Say and Charles Babbage: “Improvements in machinery ... have been made by the ingenuity of the makers of the machines ... and some by that of those who are called philosophers or men of speculation, whose trade is not to do anything, but to observe everything; and who, upon that account, are often capable of combining together the powers of the most distant and dissimilar objects” (*Wealth of Nations*, 1776, Book 1, Chapter 1).

From the end of the nineteenth century, several writings appeared with titles explicitly suggesting a theory of invention, often from a psychological perspective (see box). Almost all of the theorizing defined invention in terms of combination, whether from scientists (Ernst Mach, Henri Poincaré, Albert Einstein, Jacques Hadamard) or from researchers in social sciences. The idea of combination also became multiple and “total” (covering everything). It appears from then on under various terms and the meanings are extensive: the result of the exchanges among the people from different cultures (anthropology), the contribution by accumulation or combination of several individuals to an invention (sociology), the functions or activities of an organization interacting together with the goal of producing an invention (management)

(Miettinen, 2006). Already in the nineteenth century, to many philosophers and literary critics, the imagination was a total faculty (*organic unity*) that unifies opposites: objectivity and subjectivity, mind and matter, man and nature, reason and emotion (Engell, 1981). Over the twentieth century, Gestalt psychology continued the tradition: invention is the reorganization and redefinition of organized wholes.

Theories of invention

- P. Souriau, *Théorie de l'invention*, 1881.
- O.T. Mason, *The Origins of Invention*, 1895.
- F. Paulhan, *Psychologie de l'invention*, 1901.
- A. P. Usher, *A History of Mechanical Invention*, 1929.
- J. Rossman, *The Psychology of the Inventor*, 1931.
- J.-M. Montmasson, *Invention and the Unconscious*, 1932.
- S. C. Gilfillan, *The Sociology of Invention*, 1935.
- J. Hadamard, *The Psychology of Invention in the Mathematical Field*, 1945.

5. Innovation

Among the theoreticians on the imagination in the nineteenth century, there is one named Victor Egger of the *Collège de France*. In *La parole intérieure: essai de psychologie descriptive*, published in 1881, Egger defines the imagination by introducing the concept of innovation. He distinguishes the reproductive imagination from the imagination *per se*. To Egger, only the latter is a matter of innovation: it combines and “makes” a new ensemble from old elements, while the reproductive imagination is only a memory of sensations. This is one of the rare acceptations of the term innovation in the theoretical writings of the time. Innovation is a contested term right up to the twentieth century. In consequence, innovation is discussed in terms of and with the more positive term combination among the earliest theoreticians on innovation. In fact, combination is really a precursor term to innovation.

Many trace the origin of theoretical interest in innovation to Joseph Schumpeter.⁹ It is rarely mentioned, however, that Schumpeter himself spoke of combination and not innovation, at least until the publication of *Business Cycles* (Schumpeter, 1939). The first edition (in German) of *The Theory of Economic Development* (1912) does not make use of the concept. The second edition (1926), as well as the translation into English (Schumpeter, 1934), introduces the term innovation in the sense of newness. Innovation remained a secondary idea. It is rather combination that is defined explicitly in terms of what would become innovation in 1939: a new combination of factors of production (labour and capital). That said, Schumpeter introduces at least four different definitions of innovation in this 1939 book.

The omission of the term innovation by economists in the first half of the twentieth century is symptomatic of the denial that innovation was still subjected to in the vocabulary, but it is also witness to a step in the construction of a representation of innovation. Basically, before coming to be defined in fundamentally economic terms as it is today, innovation was a matter of combination. Schumpeter is not the only one to talk about innovation in these terms. The sociologist Gabriel Tarde preceded him at the end of the nineteenth century (Tarde, 1890), as did the American sociologist Lester Ward (Ward, 1903). Vilfredo Pareto also speaks of innovation in terms of combination. In his *Traité de sociologie générale* (1917), the sociologist explains society in

terms of psychological categories, two of which are fundamental. A first class of individuals is distinguished by its spirit of innovation, called combination, and a second by its conservatism. To Pareto, combination unites disparate elements to create a new entity. This is the principal factor that explains the political, economic and cultural systems as well as social change.

Today, the literature on innovation does not study innovation as combination. Theoreticians on technological (invention and) innovation, from the very earliest (e.g.: Abbot P. Usher, Colum S. Gilfillan, Josef A. Schumpeter, Simon Kuznets, Everett M. Rogers, Chris Freeman) up to today (Basalla, 1988; Arthur, 2009) regularly define or rather briefly mention innovation using the idea of combination, but without studying the phenomenon.¹⁰ There is also a research tradition (*technological change*) that defines innovation in terms of a new combination of factors of production. But combination here has no connotation at all relating to creativity. It is essentially economic: the substitution of labour and capital in a new way (or combination). In addition, the idea of combination in economics is very frequently associated pejoratively with imitation or a minor (incremental) innovation. Not novel (revolutionary) enough. It is *bricolage*, in the Claude Lévi-Strauss sense (*The Savage Mind*, 1962: 16–36): a *bricoleur* combines bits and pieces, remains and remnants of previous activities in a contingent way. Except for some occasional articles (such as Kogut and Zander, 1992; Weitzman, 1998; Fleming, 2001; Faucheux and Forest, 2012), the only analytical writing on combination worth mentioning is that of the American anthropologist Homer G. Barnett: *Innovation: The Basis of Cultural Change* (1953). In fact, over the twentieth century the representation of innovation as a faculty of combination gave way to an economic representation that became dominant and even hegemonic: innovation is the commercialization of an invention.

6. Creative innovation

However, there remains a residue of the idea of combination in that of creativity. The idea of creativity is very old (Nahm, 1973–74; Tatarkiewicz, 1980; Kristeller, 1983; Mason, 2003) and the theoretical explanations are many: anthropological, historical, social, psychological, metaphysical (mystery), accidental (chance) (MacKinnon *et al.*, 1968; Miettinen, 1996; Simonton; 2004; Kronfeldner, 2009). In the twentieth century, the idea of creativity is ubiquitous among anthropologists trying to explain invention in all its forms. The philosopher John Dewey applies the concept of creativity to all forms of human activity and experience. A significant quantity of writing also comes from psychology: different groups of selected professionals are studied (artists, scientists, inventors) in order to identify (measure) the source and the conditions for the emergence of creativity. The researchers Morris Stein, Calvin Taylor and Anne Roe are among the most prolific authors. Well-known authors such as Robert Merton and Thomas Kuhn have produced papers on creativity too (Kuhn, 1959; Merton, 1965).

The historical development of societies (civilization) is also explained in terms of creativity. There are the creative man of Florian Znaniecki (1918–20), the creative minority of Arnold Toynbee (1957), and the creative eras of Reinhold Niebuhr (1941) and Alfred Kroeber (1944). Today, we speak of “creative classes”, “creative industries”, “creative economy”, “creative culture”, expressions that strive to be all-encompassing and creativity covers almost everything that is not manual (and much more). Organizations (European Commission) decreed 2008 to be the year of creativity ... and innovation.

In the twentieth century, the idea of technological innovation is closely linked to that of creativity too, starting with economic historian A. P. Usher (1929). Among the many definitions that Schumpeter gives of innovation, one makes reference to creativity, itself defined in terms of “energy”, as Thorstein Veblen and Lester Ward had done before him – and as Coleridge and

many others had said of the imagination: innovation requires a “surplus of energy”.¹¹ We also owe to Schumpeter the “popularization” of an expression that has become a cliché to many: capitalism is “creative destruction” (Schumpeter, 1942). Innovation destroys old things to create new ones. However, the idea of creative destruction (and often the expression) can be found prior and simultaneously to Schumpeter: Friedrich Nietzsche, Werner Sombart, Paul Tillich and Fritz Redlich.

Despite the fad for creativity today, the idea of creative innovation remains more often than not a cliché. This is particularly the case with the literature on management of technology and organizational innovation, which made abundant use of the idea of creativity starting in the 1950s, but also with the literature on technological innovation in general. Early such titles include *Creativity and Innovation* by John Haefele (1962) and *The Creative Organization* by Gary Steiner (1965). Another testimony to this wave of interest in creativity is the re-edition of the classic work by Joseph Rossman, *The Psychology of the Inventor* (1931), the title of which became *Industrial Creativity: The Psychology of the Inventor* in 1964. However, the reader would be hard put to find in these writings an analysis of what creativity is – if it is not just a synonym for “productivity”.¹² The same is true of recent writings, as I mentioned in the introduction.

The concept of creativity has been relegated to a metamorphic role in recent decades, at least with regard to analyzing technological innovation. Creativity, or rather analyzing creativity, has shifted to what is conventionally called innovation, and to the study of innovation as *process*. Psychological analysis has been replaced by social and economic analysis. With analogies, however. Innovation is a process that takes place according to steps analogous to the stages of cognitive development and/or of the life cycle of an organism. In spite all of this, the concept of – or rather the word – creativity remains in the vocabulary. It is used, in this case, as a label to name the process of innovation. The historian of technology John Staudenmaier for example, in a chapter of his otherwise-excellent study on the history of technology as seen through articles published in the journal *Technology and Culture*, a chapter titled *Emerging Technology and the Mystery of Creativity*, discusses creativity in terms of the process of innovation by stages, or rather substitutes for a psychological analysis of creativity an analysis in terms of socio-economic stages – because invention remains of a “mysterious nature” to historians who “rarely approach the topic of the individual creative process” (Staudenmaier, 1985: 41). By the end of the chapter, creativity has become a socio-economic process of invention, development and innovation.

7. Science, R&D and innovation

Yet, the idea of creativity has led to a specific representation of innovation over the twentieth century: that of research and development (R&D). To understand this, one has to remember that, for several decades now, technological innovation has been postulated as intimately linked to science or invention. As a matter of fact, the concept of innovation entered into science in the nineteenth century as the “introduction of the scientific method into the useful arts” (Godin, 2014). Over the next century, theorists on innovation extended this understanding to the “application of science to industry”.¹³ Industrial R&D laboratories hold a special place here, and they have been studied precisely for their central role, so it is said, in the generation of technological innovation.

This phrase or concept of R&D has contaminated innovation and transmitted its connotation of creativity to innovation in the following way. First, from the early theoretical thoughts on technological invention to the first world-wide standardized definition of R&D for survey purposes (OECD, 1962; 1970), R&D is defined as innovation and creativity:

The guiding line to distinguish R. and D. activity from non-research activity is the presence or absence of an element of **novelty** or **innovation**. Insofar as the activity follows an established routine pattern it is not R. and D.

(OECD, 1962: 16)

Research and experimental development may be defined as **creative** work undertaken on a systematic basis to increase the stock of scientific and technical knowledge and to use this stock of knowledge to devise new applications.

(OECD, 1970: 8)

Second, R&D so defined has been imagined as the source or first step in the process of innovation. The first theory of technological innovation, known as the linear model of innovation, states that innovation starts from basic research, then moves on to applied research then to development – despite the oft-repeated distinction drawn between invention and innovation.

Third, in statistical and econometric matters – a whole “industry” or business by the way – R&D is used as a proxy for innovation. And today, R&D remains the main official statistics on innovation, or at least the first and central one that is discussed when talking about innovation in statistical scoreboards, for example.

In spite of all this, our main conclusion remains true. Although creativity defines innovation, through science or R&D, there is no study of creativity *per se* in the literature. The idea of creativity is in the background, namely it defines related concepts associated with innovation, but it is not theorized upon.

8. Conclusion

Innovation has become a cliché that, to many, there is no need to define or analyze. The term is applied at every opportunity, some even going so far as to be amazed not to find it in the arts (Oakley *et al.*, 2008) – an innovative field it may be, but one that has its own vocabulary (creation) without any need for the concept of innovation.

To limit ourselves to saying that knowledge and innovation are synonymous with creativity and vice versa is not enough. The association (the combination!) of the two ideas has become a slogan.¹⁴ Creativity says nothing more here than change and/or newness. As if the thinking is already done and the “mystery” explained. This pseudo-thinking is now embodied in the word in an impressive and allusive form. But if one wishes to add substance to the analysis of innovation in its relationships to creativity, one must necessarily at some point explicitly study the creative act. For decades, the issue of creativity is treated more felicitously in the literature on invention. Yet, in that on technological innovation, creativity is too often taken as a given. Creativity is a word, nothing but a word, at best a metaphor. A metaphor, since only the individual innovates – it is an anthropocentric conception that attributes the power of creation to God, to Nature (Bergson, 1907) ... or to animals (Reader and Laland, 2003). It is also in a metaphoric sense that we say, *ad nauseam*, that a society or that the economy is creative. Society changes; it does not innovate.¹⁵

The psychological explanation, no matter which psychological explanation, is no longer in favour, except among psychologists (but few of them take an interest in innovation). Perhaps it is that we have retained from the psychological explanation of creativity a discredited conception, that of mystery and genius. But besides this more-than-century-old conception, there is combination, which may be studied empirically: machines come apart in order to study the combination; new theories analyze themselves in order to count up borrowings and interdisciplinary

activity. Innovation is indeed a combination. But the study of combination no longer takes place. Certainly social researchers mention regularly the idea that innovation is a combination, but only in passing. The study of combination and creativity necessitates empirical and historical research, like looking at different versions of an idea or thing over time.

Innovation has acquired a dominant connotation that today is under the wing of economics. Beyond the economic dimension, it appears extremely difficult, even for “alternative” researchers (such as the so-called evolutionary economists), to study the cultural (creative) dimension of innovation.

Notes

- 1 I sincerely thank Reijo Miettinen for comments on a first draft of the paper.
- 2 A more inclusive definition is provided implicitly in the introduction: “the tale of technological creativity requires citing who first came up with an idea [invention] and who made the critical revisions and improvements necessary for the idea to work” (Mokyr, 1990: 12).
- 3 Like Foray and Mokyr, Alter makes use of the Schumpeter metaphor too.
- 4 In this paper from 1947, Schumpeter proceeds as our authors do, or rather our authors proceed exactly as Schumpeter does. First, Schumpeter suggests that “economic change” is a “sadly neglected area” of study. Second, he brings a definition of creativity (as a synonym to economic change, as cited above). Third, Schumpeter discusses the mysterious characteristics of creativity: it “cannot be predicted”, but it has enormous effects (“shapes the whole course of subsequent events”); it has something to do with the “quality of the personnel” and with “individual decisions, actions”. Fourth, Schumpeter defines economics (the entrepreneur) in terms of innovation (a subset of creativity): “the doing of new things or the doing of things that are already being done in a new way”.
- 5 The reader is invited to consult the following site for precise archival references to this section: www.csiic.ca.
- 6 In the seventeenth and eighteenth centuries, we find a few (rare) mentions among philosophers of the fact that the imagination produces something entirely new or original, something different from its group of components, for example among certain English associationists such as Alexander Bain (Warren, 1921) and Franz von Baader in Germany (Faivre, 1981). The idea of the creative imagination is also present in Kant and the post-Kantians (Warnock, 1976; Kearney, 1988).
- 7 On the creative imagination in philosophy and religion before that date, seen as power to act upon the world (magical and demiurgical power), see Faivre (1981).
- 8 In the field of literature and the arts, however, the concept of creation has come to have precedence over that of invention. Basically, after Francis Bacon, invention acquired a “technological” connotation. On the history of the concept of invention, see Sergeant (1923), Watson (2001) and Langer (2008).
- 9 Wrongly, because: 1. Schumpeter was not the only one to produce writings on innovation at the time – others preceded him (Gabriel Tarde in 1890, Thorstein Veblen in 1899, Lester Ward in 1903), or were writing at the same time he was (Vilfredo Pareto in 1917), and from a much broader perspective than his – I should mention, however, that the first edition of *The Theory of Economic Development* contained a chapter of a “sociological” nature that was abandoned in subsequent editions; also, an article was recently unearthed titled *Development*, never published, that dealt with innovation in a general way; 2. Schumpeter’s “theory” comes down to some ten pages, no more and no less than others before him had produced, with the exception of Tarde; 3. Schumpeter’s theory concentrates on the economy only and is indistinguishable from the writings on technological change, from which it also espouses the conception of innovation. In short, Schumpeter is a symbolic figure to economists. It was rather the (many) followers of Schumpeter who developed his ideas after his death, such as Rupert W. Maclaurin and Fritz Redlich. However, these two are completely forgotten today, at least in the literature from “innovation studies” (Godin, 2008).
- 10 For example, the British economist Chris Freeman’s combination makes analogies with Abbott P. Usher’s “Gestalt” theory of an “imaginative process of ‘matching’ ideas”. “All theories of discovery and creativity stress the concept of imaginative association or combination of ideas”, states Freeman: “coupling first takes place in the minds of imaginative people” (Freeman, 1982: 111–12). Then Freeman expands, without further analysis, the theory of the mind to “the whole of the experimental

development work and the introduction of the new product” – “linking and coordinating different sections, departments and individuals”, “communication within the firm and between the firm and its prospective customer” (Freeman, 1982: 112) – and the entrepreneur: “the crucial contribution of the entrepreneur is to *link* the novel ideas and the market” (Freeman, 1982: 110).

- 11 “Power” and “energy” are two key terms of the vocabulary of imagination in the eighteenth and nineteenth century. In *The Theory of Economic Development* (1934), Schumpeter talks of the entrepreneur as innovator in these terms too. The terms used (and opposed to routine) are energy – “exercising one’s energy and ingenuity” – motive power, effort, strength, great surplus force (Schumpeter, 1934: 81–94).
- 12 At the time it was a matter of increasing the number of inventions or productivity within enterprises. Conditions were therefore studied that were likely to encourage “creativity”. Researchers as consultants to organizations are well represented in this type of literature.
- 13 The results of scientific research – inventions – as well as the scientific method.
- 14 As J. H. McPherson, manager, Psychology Department, Dow Chemical Company, puts it in his paper on “creative engineers”: “engineers expect to carry their brain children on out to maturity – through pilot plant and production plant on out to the marketplace ... to carry an idea out through the verification stages, reduction to practice ... to get ideas off the ground” (McPherson, 1965: 33–35).
- 15 Certainly metaphor is a source of knowledge. However, to some researchers the metaphor replaces knowledge. On uses of the idea of creativity in social sciences, see Joas (1996).

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