



# Rethinking invention: cognition and the economics of technological creativity

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## Abstract

Typically, economists have not devoted much attention to the act of invention. This article attempts to redress this situation by exploring a form of cognition, analogical transfer, which is thought by some researchers to lie at the heart of successful creativity. An analogical transfer is said to have occurred when information and experiences from one known situation are retrieved and utilized in the search for the solution to an entirely different situation. This article shows how such analogical thought can give rise to a theoretical framework in which disparate factors pertaining to technological creativity can be pieced together in a meaningful manner.

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## 1. Introduction

While most economists accept, even if merely for didactic purposes, Schumpeter's depiction of technological change as a linear process of invention, innovation and diffusion, the bulk of their attention has typically concentrated on the later stages of that process. Such a focus has undoubtedly advanced knowledge of the commercial dimensions of introducing

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and developing new technologies; it has, however, shed little light on the topics of invention, technological creativity and knowledge production. Where do ideas come from? As Weitzman (1996, p. 209) notes, in economics:

‘New ideas’ are simply taken to be an exogenously determined function of ‘research effort’ in the spirit of a humdrum conventional relationship between inputs and outputs. Essentially, this approach represents a theory of knowledge production that tries to do an end run around describing the creative act that produces the new ideas.

Recent evolutionary approaches to technological change have altered this situation little (Dosi, 1997; Teece, 2000). Although firmly grounded in empirical findings, this research program has yet to provide an explicit theory of knowledge creation. Instead, such approaches offer only a description, albeit a relatively sophisticated one, of the outcome of technological creativity. They tell us that new technologies tend to be incremental, local, firm-specific, following certain clearly defined paths as determined by the reigning technological paradigm and a range of inducement mechanisms. They do not tell us, however, how new technological ideas with such characteristics actually come about.

On the whole, therefore, other than a dispute over whether the process is essentially demand- or supply-driven, economics has not had much to say about invention. What explains this apparent lack of interest? There seem to be two explanations. First, it is generally believed that invention is of no economic importance, the true economic value of an idea coming of age only with the successful completion of the process of innovation. Second, it is often contended that invention simply cannot be modelled. McCloskey (1995, pp. 115–116, 119, 120), for example, has argued that ‘profitable creativity . . . cannot possibly be mechanical. It cannot possibly be because if it were then everyone would buy the machine and use it. The new technique would then become routine and unprofitable, contrary to the premiss’. In other words, ‘creativity itself cannot be produced by formula, or else it would already have been’.

How valid are these views? Let us consider each in turn. Is invention really unrelated to innovation and, hence, unimportant? If a short-term, commercial perspective of technological change is adopted, such a statement has plausibility. A firm choosing which technology to adopt, after all, cares little about from whence the original idea for the technology came. However, when we look at the process of technological change from a broader, more dynamic perspective, it seems less persuasive. The reality of the matter is that throughout history, economies that have been technologically creative have demonstrated considerable flair in both the acts of invention and innovation (Mokyr, 1990, p. 11). This is hardly surprising; persistently successful innovation and, ultimately, sustained economic growth require a constant stream of new ideas so as to prevent diminishing returns to innovative efforts from setting in Mokyr (2002, p. 3).

What of McCloskey’s impossibility theorem? Clearly, she is right in stating that existing theories of creativity and invention have proved particularly impotent in producing creativeness on demand; yet, all such an exercise demonstrates is the limits of our existing knowledge, not that there are fundamental limits to what we can possibly know about the subject. McCloskey is also wrong to claim that if we did have a perfect understanding of creativity, profitable invention would come to a halt because everyone would have access to such knowledge. It would not. In the unlikely event that everyone did have a full

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