



Innovation Plucked from the Zeitgeist

A method to quantify the phenomenon of simultaneous discoveries sheds insight into how one innovation wins and another is left on the shelf.

Have you ever had a bright idea at nearly the exact moment as someone else? It's bizarre, yet difficult to explain. Consider Newton and Leibniz inventing calculus nearly at the same time. The reasons that two people come up with the same concept in different parts of the world at nearly the same point in time are not well understood, unfortunately. Is it innate, the environment or something else entirely?

Sometimes it's clear that an urgent puzzle must be solved. For example, there are now **more than 150 teams** searching for a Covid-19 vaccine, and it may turn into the largest simultaneous discovery ever. Yet most simultaneous discoveries don't have the same obvious driver as the rush for a coronavirus vaccine.

Another possibility for the appearance of "idea twins" is something far more nebulous: the zeitgeist, or the coming together of time and culture in a way that brings such an innovation to fruition. For example, **energy conservation** was a simultaneous discovery which stemmed from scientific advances, general concern about engines and the popularity of *Naturphilosophie* in the early 19th century. This school of thought was particularly influential in the German-speaking world which made a disproportionate contribution to the discoveries. It seems that energy conservation emerged from the zeitgeist.

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Like Newton and Leibniz, another famous pair who came up with similar inventions – disclosing their invention on the same day – were Elisha Gray and Alexander Bell who invented the telephone. Most of us know of Bell yet practically no one has heard of Gray. One invention was successful and credit was bestowed on one inventor for the original iteration of what you are now probably reading this article on. Intuitively, it makes sense to compare the two because they had the same idea at the same time. As with human twins, simultaneous discoveries or "idea twins" can be studied to find out why it is that one invention goes down in history while the other languishes in anonymity.

A method for a phenomenon

Pinning down the phenomenon of idea twins is no easy task, but it's been attempted for more than a century. **Ogburn and Thomas**, in 1922, listed 148 instances in a paper that went on to be pilloried for imprecision about what exactly comprises an idea twin.

Before we can mine idea twins for the insights into innovation they may contain, we need a way to identify and quantify them. In my recent article in the *Strategic Management Journal*, "**Idea twins: Simultaneous discoveries as a research tool**", I describe a new method that generates lists of recent

simultaneous discoveries in science systematically and automatically using openly available sources. Think of it as a new kind of microscope that will enable us to see innovations differently.

Studying idea twins, especially in terms of innovation, is useful to teach us not only what is successful but what could have been successful, but isn't. Perhaps the environment for one twin wasn't optimal, or that idea emerged in the wrong place or at the wrong time. In studying twins, it may be possible to deepen our understanding of what makes new ideas take off.

Credit as a social construct

In her book, **Susan Cozzens** described the conflict around who receives credit when more than one person has a discovery in the field of medicine. How does a community resolve that conflict and how is it handled? She found that credit allocation is an emergent and collective process, and that this process is visible in the way the community cites research articles. A discovery is a representation of someone's contribution – it lies in the eyes of the beholder. Credit allocation for a new idea is a social construct.

Using systematic adjacent co-citations in the literature to identify instances in which two papers share credit for the same discovery, my method allows others to create their own datasets of idea twins in science. Yet a list of pairs on its own isn't enough, we need to measure how similar the twins are.

In the **dataset** of 10,927 pairs that I've made available in open access, I define four measures of within-pair similarity. Now, anyone can choose the similarity threshold they want for two papers to count as twins: rate of co-citation, semantic similarity, publication month difference and back-to-back publication (when journals publish very similar articles next to each other so authors share credit). Like human twins, some paper twins are more identical than others. In the paper, I highlight those measures in the case of three simultaneous discoveries that were awarded the Nobel Prize in Physiology and Medicine in 1975, 1993 and 2019.

My method is deeply rooted in the way credit is allocated in science. It therefore highlights an aspect of science that is seldom noticed. Science as an institution rewards priority, but it is flexible enough to allow for credit sharing among multiple teams. The same is not true for technological inventions. The creative process leading to invention might be the same as that leading to scientific discoveries, but that work takes place in a very different institutional setup. Even if many inventors have the same idea at the same time, the

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patent system forces the allocation of rewards onto one team and one team only. This might seem arbitrary, but those are the rules of the game. Clearly, the occurrence of idea twins raises questions about the fairness of those rules.

The uniqueness of new ideas

For decades, social scientists had been involved in sometimes fierce debates about what counts or does not count as being a twin. Even in cases where two individuals have exactly the same idea, they might not have arrived at the concept in the same way and might not have used the same words to describe it. Where should one draw the line? The question seems esoteric, but its implications are real. Creativity is generally described as tightly linked to originality. Yet, if idea twins are common and involve some of the biggest breakthroughs, then creativity might not be about being unique or different. Instead, it might be about being first. This represents a sea change in the way we think about creative success.

How and why some new ideas appear more unique than others remains little understood. In fact, the phenomenon of idea twins has been hardly acknowledged in the scholarly literature over the past few decades. But by using this method, it seems possible to improve our understanding of innovation and creativity.

A few years after I started working on this phenomenon, I discovered that several teams had started investigating idea overlap in **patent interferences**, **European patent citations**, **patent applications** and even **protein structure repositories**.

Could the idea of "idea twins" itself be in the air?

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