The Search Patterns that Lead to Big Ideas

Researchers from New York University, Cornell, and Tel Aviv show how inventors discover unusual breakthroughs

NEW YORK, NY, UNITED STATES, April 24, 2020 /EINPresswire.com/ -- What do spider-silk lactating goats and nitric-oxide coated arterial stents have in common? Both were revolutionary ideas that resulted in "outlier" inventions – inventions that were very technologically different from existing technologies when they were developed. Three researchers, Madeline Kneeland (Cornell), Melissa Schilling (New York University) and Barak Aharonson (Tel Aviv University) were studying how to identify such "outlier" inventions when they began to wonder if they could identify the search processes inventors used to arrive at these unusual discoveries. Though often these discoveries are attributed to a lucky accident, the researchers suspected this was not the whole answer – they believed that there might be systematic differences in search processes that lead to "outlier" inventions. As noted by Professor Melissa Schilling of New York University, "We believed there were probably specific types of search processes – ways of tackling a problem – that increase the likelihood of finding radical and unusual solutions. We wanted to understand these better so that managers could harness them when they are looking for breakthrough innovations."

Using a combination of interviews with inventors and data on the 1.5 million patent applications approved by the U.S. Patent and Trademark Office from 1990 to 2000, they set out to see if they could identify those search patterns that increase the likelihood of outlier discoveries. They found that while serendipity did play a role for a number of the outliers, there were also other more reliable factors that were significantly associated with outlier innovations. First, patents from outlier innovations were significantly more likely to have university assignees and to cite scientific articles, suggesting that basic science may enable scientists to theoretically deduce untried technological solutions. Second, they found that inventors of outlier patents had significant less prior patenting experience overall, but they had, on average, patented in a wider range of areas and thus were likely to have greater breadth of technological experience. Third, the researchers found that outlier inventions were often the result of a long and winding search path where the inventors did not patent the intermediate outcomes. The spider-silk lactating goats provide an illustrative example: Jeffrey Turner was working on modifying cow mammary glands to produce lactose free milk when he realized he could probably modify any ruminant mammary gland to produce any protein. Spider silk protein was an alluring possibility because of its enormous strength-to-weight ratio, and the difficulty of harvesting it directly from spiders. The path to harvesting spider silk from goats, however, was complicated, and included (among other things) first developing the capability of spider silk lactation in mice, developing a new kind of goat, solving crystallization problems of the protein in the goat mammary gland, and spinning methods to recombine the protein strands into usable silk. As Turner's partner Costas Karatzas noted in an interview, "From saying 'yes' to Jeff to where we brought it with investment and research was quite a ride", adding, "You go from a piece of DNA all the way to something soluble, but that's not the end of it. All of the other companies would stop there. Here, you have the goat, but you're way way far from the final product. Because the goat is now your starting material. You need to take it and modify it to become a fiber, and that fiber has to become a product...When you are on these innovative paths, you never know what's going to happen."

The results of their study were published in an article in Organization Science and the full text can be found here: https://pubsonline.informs.org/doi/10.1287/orsc.2019.1328 and the researchers can be reached at mschilli@stern.nyu.edu (Melissa Schilling), kneeland@cornell.edu

(Madeline Kneeland), or aharonson@tau.ac.il (Barak Aharonson).

Melissa Schilling
Stern School of Business, NYU
email us here
Visit us on social media:
Twitter
LinkedIn