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The Buzzwords of the Crowd

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IN his novel "Tender Is the Night," F. Scott Fitzgerald wrote that American tourists in Europe languished whenever "no fragments of their own thoughts came suddenly from the minds of others."

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Fitzgerald wasn't alone in intuiting the social relationship of language and thought; George Orwell wrote of "gumming together long strips of words which have already been set into order by someone else."

These writers would surely have marveled at Google's new n-gram tool, which draws on a database of millions of books, in multiple languages, to show the annual popularity of any published word or phrase over the last several centuries.

Kiersten Essenpreis

The long time span of the database allows us to see how a word's popularity rises and falls smoothly through social diffusion, like "theretofore" from the late 19th century, "flapper" from the 1920s, "groovy" from the 1960s and "deconstruction" from the 1970s. The rise and fall of "theretofore" took most of a century, while "feminist" rose in the final two decades of the 20th century and was already on its way down by 2000.

We can see this in specific fields, too, like science. There's no question that certain innocuous words in the scientific literature, like "robust" and "nuanced," have become trendy. And it's easy to track the rise of specific fields: the surge in the phrase "plate tectonics" in the 1960s, for example.

These insights into the evolutionary history of words raise an important question: could fashionable buzzwords reflect the limits of public interest in a particular area of science? And what if the relative ubiquity of certain words affected what scientists chose to focus on?

We considered this question in a recent paper. Using the raw data in Google's freely available files, we focused on general books in English about climate science. We then obtained the yearly popularity data for a specific set of key words, like "biodiversity," "global," "Holocene" and "paleoclimate."

We then established a baseline: for the last 300 years, the number of words published annually grew exponentially by about 3 percent per year. From about 20 million words for 1700, the annual word count grew to several trillion for 2000.

Against this baseline, we took the popularity data for each key word over the years and plotted them along a timeline according to a mathematical model of fashion waves. In that model, the chance that a word, as part of a quotation, is copied into another text increases with the popularity of the word (more instances if it is around to copy), whereas the chance of that word appearing by itself is always the same. Most of our key words fit this model perfectly.

We must be careful here, because we do not want to confuse fashionable copying effects with simple adoption of words necessary to communicate new ideas. The word "automobile" peaked in the 1940s and has declined in popularity since. But that doesn't mean the importance of cars has declined. Similarly, the Holocene is no less real as a geologic epoch because the popularity of the word (in books) peaked about a decade ago.

Still, we found that almost all the climate-science key words on our list were now becoming passé in public usage, in their remarkably predictable, mathematical way.

Interesting, a scientist might say, but who cares? What does it matter if the current vocabulary of a field is on the downside of popularity in the wider public realm?

From a policy standpoint, and for any scientist wishing to affect policy or public opinion, the trendiness of words in their field is of obvious interest — the less the public uses the words from a field of research, the less likely it may be to gather insights from that field.

But what about scientists uninterested in the world outside the lab, so to speak? Within the narrow realm of climate science literature, key words were not subject to nearly the same degree of boom-and-bust patterns as in the popular media. Our findings highlight the benefits of rigorous, specialist-access academic journals that can be a bulwark against all the chatter that otherwise blurs the lines between scientific work and social media.

Will that be enough, though, in the Internet age? Traditional printed books and journals, the coin of the scientific realm, now share attention space with digital media, where fashion cycles are faster, the lines between academic science and public discourse blur, and scientists are deluged with information.

And, as we have found, when humans are overloaded with choices, they tend to copy others and follow trends, especially apparently successful ones. In a time of sound bites and viral tweets, scientists are under pressure to have public "impact" (another rising buzzword) as well as to publish splashy, highly cited articles. This is a clear trend, as reference lists focus more and more on recent articles in top-tier journals like Nature and Science.

A current decline in popularity of key words associated with a certain science may well predict a decline in the practice of that science itself, as younger generations pick up on other rising topics in popular literature. But we shouldn't despair: knowing the pressures on scientists and what is at stake, we can equip ourselves to use big data to ferret out the signatures of trend chasing. We can use tools like Google n-gram to identify trends and counteract the deleterious effect of buzzwords on scientific research.

Popularity does not guarantee quality. The "wisdom of crowds" requires the space to think independently first.

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