In science, small groups create big ideas

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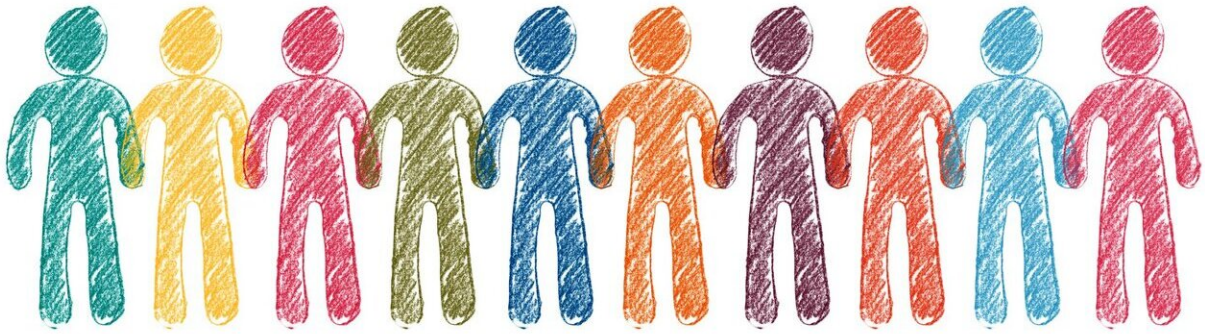

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In research and development, new topics are always emerging, maturing, and converging. Some of them quietly fade away, but others become the fundamental driving forces of innovation. Research organizations want to encourage the development of emerging topics, but small groups of scientists can find it risky to spend time on an unproven approach. Even if a new topic turns out to be important, it might be co-opted by larger

research groups with more resources, which may discourage some researchers from exploring them further.

However, it is exactly these small groups that are more likely to discover emerging topics, according to researchers from the University of Tsukuba in a study recently published in *Scientometrics*. The researchers clustered PubMed data and keywords to identify past and current emerging topics in life science and medicine. They then looked at how individual researchers engaged with these topics using author lists of related articles published between 1970 and 2018.

"We specifically keyed in on when researchers first started to focus on specific research keywords that later became emerging keywords," explains Professor Ryosuke Ohniwa, lead author of the study. "We also followed their activities afterwards."

They found that the number of authors per article has increased, particularly since 2000. They also found that, over the past 40 years, emerging keywords tend to be generated by a small pool of authors who repeatedly publish on those topics. After the 1990s, smaller teams with fewer publications were key in generating topics that included high-performance emerging keywords, and since 2002, teams who have generated such keywords often continue to report progress on the same topic.

"Many of these changes happened around the time the Human Genome Project was completed," says Ohniwa. Until the late 1990s, interesting and novel findings could be generated by the identification and manipulation of genes. By contrast, in the modern "post-genomic era," there is a greater focus on studies that re-analyze old topics using newly developed methods such as computational techniques, large-scale analyses, and nano-scale analyses, which require more researchers.

One interpretation of the team's findings is that small and large research teams have different roles to play in the development of new ideas in science. Although large groups have many benefits, Professor Ohniwa stresses that it remains important to retain small research groups to generate and nurture emerging topics, which ultimately drive innovation in research.

More information: Ryosuke L. Ohniwa et al, Researcher dynamics in the generation of emerging topics in life sciences and medicine, *Scientometrics* (2022). DOI: 10.1007/s11192-021-04233-1

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