Sails and Anchors: The Complementarity of Exploratory and Exploitative Scientists in Knowledge Creation *

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Abstract

This paper investigates the relationship between scientists' cognitive profile and their ability to generate innovative ideas and gain scientific recognition. We propose a novel author-level metric based on the semantic representation of researchers' past publications to measure cognitive diversity both at individual and team levels. Using PubMed Knowledge Graph (PKG), we analyze the impact of cognitive diversity on novelty, as measured by combinatorial novelty indicators and peer labels on Faculty Opinion. We assessed scientific impact through citations and disruption indicators. We show that the presence of exploratory individuals (i.e., cognitively diverse) is beneficial in generating distant knowledge combinations, but only when balanced by a significant proportion of exploitative individuals (i.e., cognitively specialized). Furthermore, teams with a high proportion of exploitative profiles tend to consolidate science, whereas those with a significant share of both profiles tend to disrupt it. Cognitive diversity between team members appears to be always beneficial to combining more distant knowledge. However, to maximize the relevance of these distant combinations of knowledge, maintaining a limited number of exploratory individuals is essential, as exploitative individuals must question and debate their novel perspectives. These specialized individuals are the most qualified to extract the full potential of novel ideas and integrate them within the existing scientific paradigm.

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