Looking Across and Looking Beyond the Knowledge Frontier: Intellectual Distance, Novelty, and Resource Allocation in Science: Management Science (2016)

The Question: Innovative organizations must decide how to allocate resources among a set of alternative risky projects. Therefore, decision makers must rely on various sources of information, including their own expertise, to guide the direction of innovation. But experts may have biased views about the quality or potential success of projects that are similar to their own. How does the "intellectual distance" between a proposed project and an evaluator's expertise affect their judgement of the project's potential impact? Further, research proposals that are more novel or unique may be difficult to assess. How do evaluators score the potential of these highly novel projects? This paper answers these questions by randomly assigning research proposals in a prominent medical field and analyzing the scores given by evaluators with varying intellectual distance to the proposal.

The Results: Evaluators tended to give lower scores to proposals that were close to the evaluator's area of expertise. For evaluators that had never published in the same area as the proposal, they gave scores that were 0.37 points higher on a 10-point scale. Proposals that were measured to be more novel received lower scores on average. But the relationship between novelty and evaluation score is non-linear, with the least novel proposals receiving low scores, the proposals with average novelty receiving the highest scores, and then a further decrease in score for the most novel.

The Lessons: Why do evaluators give lower scores to proposals that are closer in intellectual distance? The authors conclude that the results best fit a model of bounded rationality of evaluators. Experts are more likely to judge close proposals with a critical eye because they have learned to use heuristics and clues about project shortcomings. They more readily discern problems and limitations in areas where they have experience, compared to projects where they are unfamiliar with potential pitfalls. Similarly, evaluators have difficulty extrapolating past the knowledge frontier to predict future breakthroughs. Therefore, they may conservatively underrate novel projects that have an uncertain future, even if they might eventually lead to important breakthroughs. These results inform our understanding of how experts evaluate new research projects and how expert biases may affect the pace and direction of research.

The Research Approach: Research proposals were randomly assigned to 142 evaluators drawn from the faculty of a large research-intensive medical school. Each proposal was scored on a scale of 1 to 10 on their potential impact on disease care, patients, or research. The intellectual distance between the proposal and the evaluator's area of expertise was determined by looking at whether the evaluator had ever published in the same disease category as the proposal, and by the amount of overlap between the keywords used in the evaluator's past research papers and the submitted proposal. Novelty was determined based on the number of new keyword pairs on the proposal that did not exist in the prior literature. Proposals were rated by multiple evaluators so that the scores for the same project could be compared for evaluators that were closer or farther away in intellectual distance.