Is there Still Room for Hypothetical Ideas and Simple Experiments in Modern Research?

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Scientific progress has never been driven solely by perfect data or bullet-proof methods. Rather, it has been propelled by imagination—by researchers' willingness to observe the world and ask, "What if?" Yet, according to my experience, the contemporary research landscape often suggests that speculation is suspicious, simple investigation methods are inadequate, and acceptance of submitted manuscript is reserved for those employ the most elaborate investigation methods, at least in high impact journals. This editorial argues that these trends risk narrowing the boundaries of inquisitiveness and creating even more unequal opportunities based on the financial wealth of individual researchers and institutions. The scientific method is not a ritual of complexity, but rather a disciplined form of curiosity. If we lose sight of this, we may end up optimizing precision at the expense of inspiration.

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In my opinion, the modern peer review system has developed a curious bias: a preference for experimental method sophistication that sometimes overshadows genuine insight. A manuscript with a multitude of advanced analysis methods is more likely to be accepted, even if it does not address or answer meaningful scientific questions. In contrast, a study based on a simple experimental design, no matter how sound the reasoning and how creative hypotheses are, may be dismissed as too simplistic. Sometimes it may be spurned by co-authors and colleagues before it is even submitted.

The pressure to incorporate extensive and advanced analytical techniques can distort the purpose of experimentation. A well-designed study that uses a centrifuge, scales, a heating cabinet, and logically derived hypotheses about molecular interactions in a fiber wall, can be just as scientific as a study that employs extremely computational power demanding modeling. However, reviewers often demand additional analyses, such as electron microscopy, for example, without suggesting how these methods would contribute to answering the central question. The message from such reviewer comments is clear: the path to manuscript acceptance is paved not with clarity of thought, but by technical complexity.

The inherent logic of scientific inquiry has not required researchers to prove every hypothesis irrefutably. Many influential scientific theories, for example the discoveries of the malaria medicine by Tu Youyou, and the double helix structure of DNA by James Watson and Francis Crick, began as bold conjectures with a great deal of imagination and sometimes only partial support from available evidence. What mattered was not the

immediate completeness, but rather their capacity to invent new paths for science, and to inspire productive investigation.

Today, however, I feel that there is a growing reluctance to entertain hypotheses that extend beyond demonstrated results. Several times in recent years, I have proposed mechanistic explanations that exceeded my data presented in a submitted manuscript. Reviewer feedback recommended to hold back speculation or to add more complex analyses, prior to any acceptance. It may be perceived as though creativity itself requires justification.

For me, the essence of the scientific method is beautifully straightforward. First, one should study the already published literature on subject. The next steps are to identify gaps, pose research questions, and propose hypotheses grounded in said literature and general scientific ideas of the field. Then one can design experiments to observe phenomena. After that, the observations need to be interpreted. Finally, one needs to articulate what the findings might mean, however speculative this might turn out. The last part is crucial and sometimes overlooked, but when tethered to observation, speculation is not only acceptable, it is essential. This is where creativity enters the scientific process. Here, researchers can entertain new ideas, introduce conceptual frameworks, and suggest possibilities that extend beyond the immediate dataset, no matter how sophisticated or simple their equipment and experiments are. There is intellectual value in thinking ahead of the data, provided that such thinking is transparent. An explicitly presented hypothesis that is exploratory or tentative can be honest, rather than claiming to know the answers. It serves as a signpost for future inquiries. Some scientists may test it directly. Others may challenge it. Both responses are equally welcome and generate the progress we aim for.