

MATTER OF OPINION

4 Archetype Reasons for Editorial Rejection

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What makes an innovative materials study? Conceptual novelty is intrinsically difficult to quantify. There are common pitfalls that lead to rejection without review, leading to an editorial shorthand of archetype rejections. Here, we describe the most common reasons for rejection at *Matter*.

An academic's publication record—the primary component of a *curriculum vitae* (literally Latin for “the course of your life”)—is a heavily criticized measure of scientific quality. However, the quantity and quality of published works still dominates every discussion about scientific excellence. It is still a key metric used to select candidates for faculty positions, to promote professors, and to select grant proposals for funding. As such, there is an incentive to publish in so-called “high-impact” journals. Whether one agrees with the quantitative impact factor (IF) metric associated with journals, there is no doubt that some titles are more selective (and perceived as more prestigious) than others.

This desire to publish in selective titles results in an increasing amount of submissions, which only makes the journal more selective, in a self-reinforcing process. In an ideal system, authors would know exactly which journal is appropriate and would submit accordingly. However, the pressure for an impressive CV results in a cascade effect—submit to the top tier journals and hope for the best but keep getting rejected until the appropriate level is reached. This creates excess work for editors (who have to triage, read, and eventually reject numerous submissions that overstate their impact) and for authors (who

have to revise, reformat, and resubmit each time).

It is easy to identify work that is of poor scientific quality, and those can be rejected accordingly. However, there are many studies that are fundamentally sound; present interesting, well-supported conclusions; and are in the “hot” areas of the day. However, most of those get rejected as well. Top tier journals simply cannot publish every submission—there are too many!

While it is somewhat difficult to define what makes a “innovative” paper, that certain *je ne sais quoi*, the *Matter* editorial team has recognized patterns in studies—often very good studies—that just miss the cut.

These common pitfalls arise time and time again, key warning signs in our initial assessments that often lead to rejection without review. These pitfalls are so common, in fact, that we use them as an internal shorthand for our editorial decisions (see Figure 1 for a food-inspired summary). These archetype rejections are summarized in the four sections below.

The Substitution

Substitution studies are sometimes not so easy to spot but are easy to understand. They typically occur when one effectively replicates a past study but with one component or parameter exchanged for another, with similar expectations in terms of behavior and/or performance. Consider, for example, a metal organic framework (MOF) study that looks at hydrogen storage. If there was a prior study that considered nitrogen storage, and the behavior is similar (e.g., no new chemistry), it is what we label a substitution—even if the hydrogen storage is impressive. Even if the MOF structure is changed, as

well, if the approach and behaviors are similar to prior publications, it can be seen as a simple “substitution.”

Frequently, the inspiring work (or works) can be found in the references as a smoking gun. It's particularly egregious if the prior study is from the same group or lab.

That's not to say all such studies are not innovative—sometimes, the substitution is very creative, such as swapping a peptide material for a semi-metal. The key is that, upon making the substitution, fundamentally new behaviors are observed: something exciting and unanticipated.

The Incremental

Incremental submissions are perhaps the most subjective of our archetypes. Most research—particularly materials science, which is sometimes considered a fusion science arising from fundamental physics and chemistry—is a progression from prior publications and findings. This is the very basis of our own Materials Advancement Progression (MAP) scale. Great science rarely happens in isolated “Eureka!” moments.

Incremental works are a necessary part of academic research. A single paper, no matter how rigorous, is insufficient to flesh out the implications of novel findings, from unique laboratory results to fundamental breakthroughs. Grants are awarded with the expectation of *multiple* related findings and publications surrounding a similar topic.

So, when is a study considered incremental? Our rule of thumb is judging (1) the motivation behind the step and (2) the size of the step. If the motivation is limited to expanding a single particular system, then it is too narrow. These types of papers are currently common



The 4 Rejection Archetypes, Via Cooking Metaphors



Figure 1. Food-Inspired Equivalents of Archetype Rejections

Illustration concept by Lucas Landherr and Dee Nguyen; drawn by Dee Nguyen.

in the energy field, where battery efficiency is improved via addition of interlayers, dopants, or increased porosity. Unless there is some underlying novel concept behind the addition, it is just building upon *a priori* knowledge. However, if the step results in drastic changes, then aforementioned consideration (2) can supersede consideration (1). Incremental step size is important if simple ideas result in significant changes in system response, but it is a judgement call based on the area of research.

If a submission is accompanied by a cover letter that lists an assortment of prior publications (whether from the authors' own research groups or other labs), it may have already killed the chance of peer review! If we see that the new work is simply the continuation of a long line of published works, then it is not intrinsically novel. (No matter how many citations they have received...please, do not list the number of citations...it belittles our Google Scholar skills.) If there are novel components (an unforeseen direction or twist in the scientific narrative no one in the field could have predicted), then it may qualify for consideration. Stress the novelty of this

submission in the cover letter, not the success of prior works.

The " $A + B = A + B$ "

The " $A + B$ " paper represents a "sum of parts" type of paper that can easily be extended beyond two-component systems (e.g., " $A + B + C$," or " $+ D, E$, and F "). These kinds of combinatorial papers are perhaps our most common rejection. They commonly arise when authors want to show added function for a specific application. You have a flexible conductive material? Add magnetic nanoparticles, and now you have control via magnetic fields! Is there any underlying reason to make the system more complex? No. Is there any additional understanding of the base material response? No. The end product is the expected result of the two materials/components, e.g., " $A + B = A + B$." The constituent components are well understood, and—while multifunctional—the underlying mechanisms are neither amplified nor modified in combination.

Combining components with disparate properties and behaviors is a great approach to materials design, but we are looking for the unexpected, i.e., when " $A + B = C$ " and " C " is a new emer-

gent behavior. Amplifying (" $A + B = 2A + B$ ") or suppressing (" $A + B = A + 0.5B$ ") responses can also be more interesting. The key is, it can't be an obvious combination. We already know adding hot peppers to a dish will make it spicy. Adding silver nanoparticles will make a system antimicrobial.

The Super Niche

The last archetype is an obvious but sometimes difficult decision. The scope of *Matter* is extremely broad by design, and we attempt to reach an extremely broad audience. This is both to attract readership from the largest possible pool of (interested) researchers and also to exemplify the best of science—to successfully disseminate findings that have implications across multiple fields. This is the very definition of *impact*, not some arbitrary calculated metric.

Unfortunately, super-niche manuscripts, by definition, have limited appeal. The study demonstrates a novel response of a specific materials system in a limited field under restricted conditions. If a study can only be conducted during a blue moon on a Friday the 13th while facing east in the state of Montana, few people can relate. Clearly hyperbole, but the sentiment is the same. If the appeal is limited, the chance of review is limited. We must ask: would this appeal to materials scientist who do not work on this specific subject/application/system? If the answer is no, then the paper is rejected. This is sometimes a difficult decision because great science is clearly performed, and the results are extremely interesting...to the few dozen who understand and study the subject.

Of course, there are multiple caveats to these four archetypes.

First, there are definitely more than four. These are just (in our opinion) the most frequently encountered "warning signs" in our cohort of submissions at *Matter*. Maybe it's a materials science thing. Maybe it's more general.

Second, all four archetypes are subjective. Just because a manuscript loosely fits into one of the categories does not imply immediate rejection 100% of the time. We do not rush to our editorial decisions based on a checklist. They are just our observations. Do we make mistakes? Yes. However, we hope to err on the conservative side—our motto is “when in doubt, trust peer review.” We’d rather publish something slightly below our typical standard than miss a great paper.

Finally, these archetypes do not represent bad papers or bad science. In fact, such works are necessary for the progression of science. Substitutional, incremental, combinatorial (“A + B”), and super-niche studies are not only the byproduct of groundbreaking works, they are also an inevitable progeny, necessary for widespread adoption and ultimate societal impact. It is for this very reason that thousands of academic journals exist, across a wide spectrum of topic areas and impact tiers.

Our intent here was to outline some of the common reasons for rejection we encounter on a daily basis at *Matter*. We do not intend to discourage submission but merely to increase awareness and transparency of our assessment process.

Avoid the archetypes and pitfalls. We look forward to all submissions.

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<https://doi.org/10.1016/j.matt.2019.12.001>