

# Notices

of the American Mathematical Society

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## Theorems That Should Never Have Been Proven

About five times a year I receive an unsolicited request from a journal editor to referee a paper (generally enclosed with the request); of course, I almost always agree. Some manuscripts are unpublishable because they contain false theorems, or theorems that are already in the literature, or theorems that are simple consequences of known results. The vast majority, however, contain new results with correct proofs. But then something else comes into play. Most journal editors ask their referees for an assessment of “depth”, “interest”, and “importance” along with the check for novelty and validity.

If my personal experience as a referee can be generalized, about 40 percent of the papers with new results correctly proven are insufficiently deep, important, or interesting for the journal to which they were submitted. (Journal editors probably reject even more for these reasons upon receiving neutral reports from their referees.) A persistent author can always try again with another journal—I once refereed the same paper three times for three different journals before recommending acceptance—or ask the editor to seek a second opinion. Many, especially young mathematicians or those working in lower-tier institutions, however, merely shrug and put the paper back in their files.

That is a pity. While I have seen my share of shallow, dull, and unimportant papers, it has recently occurred to me that I have never had occasion to say that one contained a theorem that should never have been proven. An informal survey among colleagues failed to turn up any examples of such either. (Everyone knows examples of *papers* that should never have been published, which is not the same thing.) So we have the following phenomenon: results are discovered by an author, they are independently checked and certified by a referee, but then the rejected paper is permanently left out of the literature.

Two decades ago there was a mythical solution: the journal *Rejecta Mathematica*, where such papers would be accepted but never published. This was the gallows humor of the untenured, who could then include in their publication lists items labeled *Rej. Math.* (to appear). But today this may actually be practical.

Suppose all serious journals, through some consortium arrangement, agreed that all the refereed correct and novel papers that they receive are to be deposited in some searchable electronic archive to which all mathematicians would have access via the Internet (maybe as a privilege of professional society membership). As a protective measure, those papers that the journals accepted for publication would remain in the archive also but be electronically locked, and only journal subscribers would have access to them. No new, true refereed theorems would ever be lost again.

To paraphrase a famous remark about books, there are theorems that are undeservedly forgotten, but there are no theorems that are undeservedly remembered. I would add also that there are no theorems that deserve never to have been proven; once proven (and checked), they deserve some measure of preservation. Of course the hope is that results that currently appear unpublishable may someday be rejuvenated as the key step in a major result. Perhaps the archive should therefore be called *Rejuvenatable Mathematics*; papers in it could then be cited as *Rej. Math.* (archived).

—Andy Magid