

Unpleasant surprises: how the Introduction has wandered into the Discussion

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The Introduction, that foundation stone of a scientific paper, is having growing pains. Authors must find a way to insert their new work into an ever denser forest of background knowledge. One tactic is to put some of the most relevant background work into the Discussion. As counterintuitive as this approach may sound, it is becoming more common, making it more difficult for the average reader to determine what is new in any given paper.

The Introduction-into-Discussion tactic is based on what is otherwise a sound approach in writing a paper: explain the work as it happened. (This is not the only basis for a paper's organization; see Wells, W.A. 2004. *J. Cell Biol.* 165:757–758 for other examples.) A fictional example of the logic is as follows:

Introduction: We set out on an unbiased hunt for interesting things in this area (e.g., ras biology), so here is some general background about ras. But of course lots of things are connected to ras, so I won't go into details. There is no way that I could have read all 31,710 papers about ras before I started, anyway.

Results: We found this amazing connection between ras and angiogenesis—look at how novel our results are!

Buried somewhere in the middle of the *Discussion:* Oh yeah, a bunch of others have found ras–angiogenesis connections, which we haven't mentioned until now because that was not what we set out to study in our unbiased hunt.

The end result is that many casual readers will think that the result is far more novel than it really is and miss out on much of the most relevant context.

Using this organizational tactic is not necessarily an attempt to boost the work's apparent significance. As pointed out above, it is based in part on a valid writ-

ing strategy and is a reasonable response to the suffocating mass of background literature. It may also stem from a failure to acknowledge changed circumstances. In the past, an unbiased screen or unexpected link was likely to land a researcher in virgin territory. That is no longer true.

A more intellectually honest strategy is possible. This approach is based on a three-part Introduction. First comes the general background that sets out the motivation for the unbiased screen. Then comes the briefest of descriptions of the main result. Finally, there is a description of the preexisting literature in this newly revealed area, so that it will be obvious how the new results add to this field.

To some, the juxtaposition of old and new sounds like the job of the Discussion. What, then, is the difference between the Introduction and Discussion? The Introduction should contain the information

that the researcher read on PubMed in an excited semi-panic after first seeing the angiogenesis effect. The rest of the experiments were, after all, based on what was read during that quick literature scan. This is the information that was known before, and it should be presented in terms of the world view that existed before the current results came along. Then the Discussion is where the new results are compared and integrated with the older literature; it outlines the world view after consideration of the new results.

Many authors are already making use of this three-part organization for Introductions. In the interest of all those time-crunched scientists who find themselves skimming papers, let's hope that more will follow their lead. Readers, reviewers, and editors must demand honesty and clarity not only in the selection of data, but also in the order in which it is presented.



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