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Meta-analyses and the "editorial love of controversy"

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Abstract. Meta-analyses are a most valuable tool to overcome the experimental constraints and often idiosyncratic responses typical in ecology. Nevertheless, competition for space in scientific journals increases editorial scrutiny, with editors frequently rejecting papers without outstanding novel results that challenge established paradigms. Whilst legitimate and generally healthy for the advance of science, this intrinsic "love of controversy" violates the independent accumulation of evidence required for conclusive meta-analyses, likely increasing the probability of false negatives and hindering our capacity to identify general rules in ecology.

Most biological communities hold an incredible diversity ranging from the individual level up to the way that species interact with each other and with the abiotic world forming highly dynamic ecosystems. This inherent complexity often results in idiosyncratic outcomes even when similar systems are exposed to the same treatment, hindering the identification of general trends in ecology (Lortie et al., 2013). Meta-analyses combine the results of several independent studies addressing similar hypotheses in order to provide a weighted average for the estimated "effect size" (Borenstein et al., 2011). By collating evidence from several sources, meta-analyses comprise a valuable solution in clarifying general cause–effect relationships in ecology, where ideal experimental designs are often hard to implement (Fernandez-Duque and Valeggia, 1994). Some sources of possible bias have been suggested to affect meta-analysis, including the incompleteness of the literature review (Thornton and Lee, 2000), and the "file-drawer problem" arising from the reluctance in publishing non-significant or negative results (Csada et al., 1996; Dwan et al., 2008; Fanelli, 2012). Here I explore a yet underappreciated publication bias that constrains the power of meta-analyses: the "editorial love of controversy".

Good science strives to offer a fair consideration to all lines of evidence regardless of their support or opposition to existing paradigms. I suggest that, on their quest for neutrality and the avoidance of the crystallization of poorly derived dogmas, many scientists have developed an intrinsic "love of controversy" which is further reflected within editorial policy. Therefore, most high-ranking journals screen the growing avalanche of incoming manuscripts by the "novelty" of their findings (Arnqvist, 2013), frequently selecting those that challenge established paradigms whilst rejecting those that present new evidence to support what has already been accepted as collective wisdom. Furthermore, controversial manuscripts are typically of higher impact within the scientific community, attracting more citations and thereby raising journal profiles (Wardle, 2012). Whilst this seems healthy for the progress of science, the "love of controversy" violates a central assumption of meta-analysis: the independent accumulation of evidence around the real effect. In essence, an accumulation in the evidence base on one side of an argument will tend to promote the accumulation of evidence on the other side, thus producing an artificial equilibrium. If controversial papers stand higher chances of publication, thereby broadening the distribution of the published outcomes, conclusions based on meta-analyses will tend to be dragged to within a "grey area" of no effect, promoting type-II errors (false negatives).

As an example, the Janzen–Connell effect, broadly accepted since the 1970s, proposes that the survival of seedlings increases with distance from the parent plant. However a recent meta-analysis did not find general support for the Janzen–Connell effect (Hyatt et al., 2003). If one assumes that evidence to the contrary has been more attractive to editors than "yet another" confirmation of this already established paradigm, it is possible that the positive discrimination

towards controversial results over time leads to a false negative while violating the assumption of independent accumulation of evidence. The tendency for the early publication of extreme findings has already been identified in molecular genetics research (Ioannidis and Trikalinos, 2005; Palmer, 1999). Here I propose that this bias towards extreme findings is not limited to early succession of publications but that it might still affect the publication of results that are "extreme" in relation to established wisdom. While this effect has not yet been formally shown, I argue that, when generalized, such an editorial bias acts against the accumulation of agreeing evidence, hindering the emergence of consensus and fuelling long-standing debates in ecology.

Relaxing the emphasis on the novelty of the results as an editorial selection criterion should reduce the positive discrimination afforded to controversial outcomes and lessen the bias due to the "editorial love of controversy". However it is reasonable to suspect that authors will nurture their own intrinsic "love of controversy" thus self-censoring appeasing results, and also that a positive feedback in the form of citations from the peer community will continue to raise the impact and visibility of controversial outputs. The magnitude of such bias might also be attenuated (although not eradicated) if non-controversial results are finally published in low-rank journals, as long as these outputs are searchable and available for future meta-analyses. While effective solutions to the bias caused by the "love of controversy" still need to be developed, it seems likely that many of the solutions developed to escape other forms of publication bias can ease the problem: conducting exhaustive literature searches, detailing prospective protocols, modelling publication biases, etc. (see Borenstein et al., 2011; Kicinski, 2013; Palmer, 1999).

Recent simulation models have questioned the severity of the selective publication of significant and positive results (i.e. file drawer problem), suggesting that this might reduce the number of publications needed for obtaining accurate meta-analytic estimations (de Winter and Happee, 2013). However the potential inflation of false negatives due to the "love of controversy" is likely to persist regardless of the debate around the file drawer problem, as long as evidence is artificially coerced to accumulate on both sides of the real effect.

The consequences of the "editorial love of controversy" are particularly worrying in conservation-led decisions, as failing to detect cause–effect relationships will likely have a more serious consequence than wrongly assuming an effect altogether (Fernandez-Duque and Valeggia, 1994). Such bias might for example contribute to an underestimation of the impacts of human pressure on the environment including impacts such as deforestation, overfishing or pollution for example.

It appears undisputable that literature reviews and meta-analyses are highly valuable tools in ecology where experimentally led research is particularly difficult and responses are often idiosyncratic. Similarly, it is reasonable to assume that highly selective editorial policies based on the intrinsic interest and novelty of the results are important in focusing the research community around quickly developing paradigms. However, I argue that, in order to take full advantage of these methods, the bias emerging from the "editorial love of controversy" needs to be acknowledged when leaning towards gaining a consensus, and formally included in meta-analysis.

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