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Journal peer review in context: a qualitative study of the social and subjective dimensions of manuscript review in biomedical publishing

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Peer- and editorial review of research submitted to biomedical journals ('manuscript review') is frequently argued to be essential for ensuring scientific quality and the dissemination of important ideas, but there is also broad agreement that manuscript review is often unsuccessful in achieving its goals. Problems with manuscript review are frequently attributed to the social and subjective dimensions of the process (e.g. bias and conflict of interest). While there have been numerous efforts to improve the process, these have had limited success. This may be because these efforts do not account sufficiently for all of the social and subjective dimensions of the process. We set out, therefore, to characterise the most salient social and subjective dimensions of the manuscript review process, from the perspective of practising reviewers and editors. Open-ended interviews were carried out with 35 journal editors, and peer reviewers in the UK, USA and Australia. It emerged from these interviews that reviewers and editors were conscious of a number of social and subjective influences on the review process including: a wide variety of motivations for participation, complex relations of power, epistemic authority and moral responsibility, and unavoidable prejudice and intuition. Importantly, these social and subjective influences were often viewed positively and were seen as expressions of, rather than threats to, editors' and reviewers' epistemic authority and expertise. From this we conclude that the social and subjective dimensions of biomedical manuscript review should be made more explicit, accommodated and even encouraged, not only because these dimensions of human relationships and judgements are unavoidable, but because their explicit presence is likely to enrich, rather than threaten the manuscript review process. We suggest a 'dialectical' model which can simultaneously accommodate, and embrace, all dimensions of the manuscript review process.

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Abstract

Peer- and editorial review of research submitted to biomedical journals ('manuscript review') is frequently argued to be essential for ensuring scientific quality and the dissemination of important ideas, but there is also broad agreement that manuscript review is often unsuccessful in achieving its goals. Problems with manuscript review are frequently attributed to the social and subjective dimensions of the process (e.g. bias and conflict of interest). While there have been numerous efforts to improve the process, these have had limited success. This may be because these efforts do not account sufficiently for *all* of the social and subjective dimensions of the process. We set out, therefore, to characterise the most salient social and subjective dimensions of the manuscript review process, from the perspective of practicing reviewers and editors. Open-ended interviews were carried out with 35 journal editors, and peer reviewers in the UK, USA and Australia. It emerged from these interviews that reviewers and editors were conscious of a number of social and subjective influences on the review process including: a wide variety of motivations for participation, complex relations of power, epistemic authority and moral responsibility, and unavoidable prejudice and intuition. Importantly, these social and subjective influences were often viewed positively and were seen as expressions of, rather than threats to, editors' and reviewers' epistemic authority and expertise. From this we conclude that the social and subjective dimensions of biomedical manuscript review should be made more explicit, accommodated and even encouraged, not only because these dimensions of human relationships and judgments are unavoidable, but because their explicit presence is likely to

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INTRODUCTION

The trouble with journal manuscript review

Pre-publication peer review of academic research manuscripts ('manuscript review') is generally seen to achieve two important goals: 1) ensuring that only high quality research is published (either by rejecting or improving sub-standard manuscripts), and 2) ensuring the dissemination of findings to interested stakeholders including researchers, practitioners, the general public and political bodies. While there is broad acceptance that some form of pre-publication review is essential, there is also broad agreement that manuscript review is often unsuccessful in achieving its goals. Manuscript reviewers are often criticised for their perceived incapacity to detect instances of scientific misconduct such as fraud, plagiarism, repetitive publication and for being anti-innovative, non-constructive and causing unacceptable delays in publishing (Rennie, 2003; Smith, 2006). Many of the concerns about manuscript review have been confirmed empirically, and there is now substantial evidence that manuscript review does not (consistently) improve the quality of manuscripts, distinguish between higher and lower quality studies, predict future citations, detect scientific fraud, or recognise and facilitate innovation (Jefferson, Rudin, Brodney Folse, & Davidoff, 2007; Overbeke & Wager, 2003).

The social and subjective dimensions of manuscript review

These problems with manuscript review are frequently attributed to the failure of editors and peer reviewers to be adequately objective, consistent, methodical, critical and/or clear about their reasoning processes—that is, the failure of manuscript review to be appropriately 'scientific' (in the idealised sense of science). It is noted, for example that, despite the existence of rudimentary guidelines for peer review, there is currently no clear definition of what constitutes a 'good' or 'bad' manuscript, leading to a process which is not consistent or reproducible (Godlee & Jefferson, 2003). Reviewers and editors are also frequently noted to be self-servingly biased against (or occasionally in favour) of particular researchers, research groups, methods and (positive) results and there is now a substantial body of empirical research confirming such biases (e.g. Resch, Ernst, & Garrow, 2000).

Numerous efforts have been made to control, if not eliminate, these influences. Efforts have been made, for example, to standardise practices across journals**,** to provide reviewers with training in scientific appraisal, and to have reviewers declare conflicts of interest and sign their reviews so that biased reviewing can be prevented or detected (Jefferson et al., 2007).

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While much attention has been paid to demonstrating these failings of manuscript review and reviewers, and to finding solutions to these problems, to date these efforts have had limited success in improving the manuscript review process or reassuring those who are concerned about it (Jefferson et al., 2007).

This has led some to argue that pre-publication manuscript review should be eliminated altogether and replaced (or at the very least supplemented) with post-publication review processes (Smith, 2006). Many people, however, continue to believe that pre-publication manuscript review plays an important role because post-publication review would place the onus on researchers and readers to evaluate a potentially unmanageable volume of manuscripts which are not necessarily in their areas of expertise (McLellan & Riis, 2003) and may also lead to a general devaluation of information and a decline in writing standards (Bingham, 2003). Moreover, it is difficult to imagine how academic peer review processes could be eliminated altogether (e.g. peer review might still be needed in the review of grant applications), so there remains a need within the scientific community to find ways to improve peer review. For these and other reasons (some of which may of course be self-serving rationalisations on the part of journal editors and others who benefit from the current system) traditional pre-publication review has not been replaced entirely and efforts to improve the process continue.

The need for qualitative research into manuscript review

There is a large body of published debate and empirical research into scientific journal peer review. Since the late 1980s, hundreds of empirical studies of the process have been carried out (Overbeke & Wager, 2003). Two systematic Cochrane reviews of studies of peer review have been published (Jefferson et al., 2007) and work relating to journal peer review has been presented at six dedicated international congresses on peer review in biomedical publication (American Medical Association). Nonetheless, as discussed above, to date these debates and research efforts have had limited success in improving the manuscript review process (Jefferson et al., 2007).

One possible explanation for this disappointing outcome is that almost all published empirical research into biomedical manuscript review thus far has been quantitative, consisting mostly of surveys of stakeholder opinions and preferences (e.g. Freda & Kearney, 2005), measurements of flaws in the process (e.g. the degree of various kinds of bias) (e.g. Resch et al., 2000) and examinations of various technical interventions (such as having reviewers sign their reviews, having reviewers declare their conflicts of interest and providing reviewers with training and feedback) (Jefferson et al., 2007)**.** While these quantitative studies have led to some important insights, it is also possible that they have limited our ability to understand, and manage, manuscript review as a complex whole and that other approaches, such as qualitative research, are required.

We are not alone in seeing this lacuna in published research into peer review and the need for qualitative studies into peer review has been recognised by some critics of existing research (Atkinson, 1999; Overbeke & Wager, 2003). Insofar as qualitative research has

been conducted into biomedical manuscript review, this has focused largely on the language used by reviewers (e.g. politeness conventions, interpersonal comments, evaluative adjectives) (e.g. Gosden, 2002) or the criteria (e.g. originality, presentation, methodological quality and importance) used by reviewers and editors (e.g. Day, Schriger, Todd, & Wears, 2002) rather than on the social and subjective underpinnings of the process.

We set out, therefore, to use qualitative methods to generate a detailed understanding of the most salient social and subjective dimensions of the biomedical manuscript review process from the perspective of working editors and peer reviewers, and to examine biomedical editors' and peer reviewers' everyday experiences of, and attitudes towards, these dimensions. Our research questions were therefore deliberately broad and descriptive, rather than normative, asking:

1) What factors, other than (just) a desire to ensure scientific quality or dissemination of ideas, might motivate an editor or reviewer to participate in the peer review process.

2) What factors, other than an (just) objective appraisal of scientific quality, might shape an editor or reviewer's appraisals, recommendations and decisions regarding publication?

3) What do editors and reviewers think of these factors, and what ambiguities and complexities do these factors generate?

Our decision to focus on the evaluative culture of *biomedical* peer review was based on our own professional backgrounds (we felt that we would be better able to understand and critique the review process if we could easily understand the scientific issues at stake), as well as an appreciation that the content of biomedical journals can have rapid social, cultural and clinical impacts.

METHODS

Data sources (LINK to supplementary table here)

Purposive sampling was used because the aim of this project was to enable conceptual exploration and theory generation rather than population representativeness. Thirty-five open-ended interviews were carried out in 2006. Twenty-three of the interviewees were current or past editors at major general medical journals in the UK, USA and Australia. Nine were current or past part-time (usually unpaid) editors of specialty journals based in Australia, the UK and the USA. Attempts were made to vary the sample as much as possible and interviews were carried out with editors of different ages, from a variety of professional backgrounds (e.g. clinical, research, other publishing roles) and from a variety of biomedical disciplines/journals including basic science, clinical/translational science, public health and health-related philosophical and social research. Of these editors, the majority had been, or were currently, engaged in research, academic writing and/or peer reviewing (as distinct, for example, from moving into editorial work from journal production/copy editing, purely clinical roles or junior research roles without reviewing responsibilities). Although the focus

of this study was on editors of subscription-based peer-reviewed journals publishing primary research and commentary, we also interviewed three current or past editors of 'review' journals (i.e. journals publishing review articles, systematic reviews and/or meta-analyses), two past editors of non-peer reviewed medical journals, one editor of an open-access journal and two people who had been reviewers but not editors. Our purpose in doing so was not to examine these groups in depth or to identify subtle differences between groups, but rather to ensure that we were not missing any major issues that might be obscured by the experience of editing 'mainstream' biomedical journals. While many participants reflected spontaneously upon their experience of being authors on the 'receiving end' of manuscript review, authors' experience was not the focus of this study. (Please note that the numbers in this section add up to more than 35 as participants often fulfilled more than one role).

The interviews lasted approximately one hour and were unstructured, which allowed participants to define and discuss manuscript review as they wished. Participants were simply asked to describe their career paths and their experiences, both positive and negative, of acting as journal editors and peer reviewers. Interviews were carried out by one researcher (WL) and were recorded and transcribed verbatim.

Data analysis and interpretation

The method of data analysis drew on both Morse's outline of the cognitive basis of qualitative research (Morse, 1994) and Charmaz's outline of data analysis in Grounded Theory (Charmaz, 2006), and involved: 1) initial coding using Charmaz's method of line-by-line analysis and "gerunding" (encoding action or process); synthesis of codes into categories; focused coding using these categories; and abstraction into concepts. A coding tree was generated using the qualitative research software NVivo 7. Throughout data analysis, a process of constant comparison was employed, with codes being continually refined, enriched and reorganised. Enough material was analysed to ensure that categories were saturated, that is, that all codes appeared to fit under one or more existing categories, and all concepts were fully described and well-understood. Our categories and concepts were then organised under a number of general headings (motivations for reviewing, power, morality, etc.). All authors were involved in reading transcripts for emergent themes and developing categories and concepts from the codes.

This study was approved by the University of Sydney Human Research Ethics Committee. Consent was obtained from all participants and from the editors-in-chief of all of the involved journals. All names are pseudonyms.

RESULTS

Motivations for participation in journal peer review

Scientific quality control and/or dissemination of knowledge

While recognising the limits to manuscript review, most reviewers and editors spoke of their deep commitment to scientific quality control so that sub-standard material was not published and so that a filtering process could be out on behalf of busy researchers and clinicians.

> Brian [Full-time editor]: We need peer review because the last thing we want to do is (publish) some information that doctors then change their clinical practice on, that hasn't been properly vetted.

Both reviewers and editors also stressed the importance of disseminating knowledge: making an effort to improve manuscripts rather than simply rejecting them, and ensuring that their "gatekeeping" role did not completely stifle their capacity to facilitate scientific communication.

> Hugh [Editor-in-Chief]: Perhaps the thing that was different about [his journal's name] was that it had a very high sensitivity as well as specificity. In other words, we were about publishing interesting, potentially controversial signals in new science. Not just things that were absolutely perfectly true.

There was a general awareness among participants that these two goals were often in conflict, in which case most privileged quality control over dissemination, frequently citing the particular dangers of publishing sub-standard research in the biomedical context.

Non-'scientific' motivations

Communal obligations and reciprocity

In addition to being concerned about the quality and dissemination of scientific information, participants also emphasised the sense of communal obligation that they felt. Many interviewees described reviewing and unpaid editing as a kind of academic "duty" and as part of the "game" of being a scientist. Editors were well aware of the many competing duties that constitute an academic's life, of which reviewing is just one, and these jobs were described as something that one is expected to "shoulder" as part of being a member of a "community of scholars". Several interviewees marvelled at the extent to which the review process is driven by the "goodwill", "commitment" and "dedication" of reviewers and unpaid editors.

Closely related to descriptions of manuscript review as a communal responsibility were portrayals of reviewing as an act of reciprocity. It was recognised that a reviewer's sense of obligation may arise from his or her sense that he or she has benefited, or may benefit in future, from the review process. Failure to reciprocate was seen as a problem:

> James [Part-time editor/reviewer]: People can see fit to publish their own papers in the journal, but when I ask them to review a paper for somebody else, they don't. I have a real problem with that. Because that's not giving back to the community...And there is nothing I can do about that, I don't think, except feel snaky.

While most participants saw their communal obligations as reasonable, if somewhat inconvenient, a few participants had a more negative view of such obligations, seeing manuscript review as an unwanted burden and noting that reviewers might experience an enormous amount of social pressure to participate—at times bordering on coercion. "Punishment" in this context was described not as formal sanction, but rather as loss of professional "reputation".

> Celia [Reviewer]: (Scientists) need to not have a reputation of someone who will never do reviews and thus is not a contributing member of the scientific community. You don't want to get that kind of reputation.

Self-interest

While some argued that reviewers have "nothing to be grateful for", others observed that reviewers may benefit directly from what can be an "interesting", "valuable", "educational" and "intellectually stimulating" activity, or a "networking opportunity" that is complementary to other academic activities.

> David [Reviewer]: You sort of learn what's good, what's bad, who's good or who isn't, and it's sort of interesting because people are doing interesting stuff and you come to grips with it better than if you are just flicking through this and that. So it's a skill toning type of thing. And it's sort of complementary to our work here, the journal club, and the things we work with the students.

Some even suggested that the process might be enjoyable for reviewers and editors who can experience the pleasure of being acknowledged by their peers as being an "expert", of facilitating the dissemination of important research, or simply of being able to engage with ideas and the written word.

Louis [Part-time editor/reviewer]: [As a reviewer] I encouraged a rewrite, and they rewrote it, and you could see that they'd taken on board all of this material although they didn't contact me directly. That's a reward, that's a good feeling...

Leslie [Editor-in-chief]: I love the written word and just fell in love with writing and editing and became intrigued, as a reviewer and an author, about the review process.

These different motivations were associated with different priorities and styles of reviewing and editing. Those concerned primarily about quality control, for example spoke of the importance of reviewers being honest and critical (even if this demands reviewer anonymity), and editors with this orientation were very reluctant to override consistently negative external reviews. Those concerned primarily with dissemination emphasised the importance of making an effort to improve important manuscripts, creativity in doing so, and a willingness to take chances with unusual but potentially important manuscripts. And those whose motivations were primarily communal focused on the need, when reviewing, to nurture their colleagues by providing constructive and encouraging feedback, as well as the need to develop their academic disciplines.

With respect to motivations for reviewing, our participants were largely unconcerned and unapologetic about the fact that different motivations might lead to different priorities and styles of reviewing and editing. Our participants were not concerned, for example, that those motivated by the desire to ensure scientific quality might be more critical than those motivated by the desire to nurture their colleagues.

Views on the process of appraising manuscripts and making decisions

Appraisals and decisions should be objective, logical and consistent

In their descriptions of their process of judgment, reviewers and editors emphasised a number of characteristics consistent with a 'scientific' ideal. An ideal review in these accounts was objective and disinterested.

Interviewer: So what is it that makes a good reviewer, what would you look for in a reviewer?

Cherie [Full-time editor]: Somebody who can give an objective critique of the strengths and weaknesses of the paper.

An ideal review was also methodical, involving the application of explicit principles; critical of the material under examination, and included a clear 'logic' with the arguments underlying an assessment being clear and transparent.

> Karin [Full-time editor]: [Describing her ideal external review] Back up your statements, if you say a paper is not novel then you should give me WHY it is not novel.

Having said this, both reviewers and editors spoke freely, and without embarrassment, of the wide variety of social and subjective factors that might affect their appraisals, recommendations, or decisions including: 1) their sense of their own authority to make judgments and decisions; 2) their sense of power and dependence upon other stakeholders or material resources; 3) their sense of moral obligation to other stakeholders and their reciprocal expectations; 4) their personal and communal biases and 5) their intuitions and affective reactions to manuscripts.

Decision-making is often shared, involving complex webs of authority and deference

First, reviewers and editors made it clear that their recommendations or decisions could be shaped by their sense of their own authority to make such judgments. Both reviewers and editors varied in the extent to which they saw themselves as possessing authority and (correspondingly) needing to defer to others.

Some reviewers and editors were confident in their own capacity and right to judge, with this confidence stemming from past or current scientific expertise, experience in reviewing or journalism, and credibility within the academic community. Those who saw themselves as possessing significant authority did not emphasise the need to defer to others. This was particularly evident among editors who saw external reviewers as "consultants" rather than decision-makers.

> Glen [Full-time editor]: We think of our reviewers as consultants to the editors…It seems my role is (like) a general internist, that specialists are consultants that help me help my patients…They don't make the decision for me.

Other reviewers and editors were less certain of their own authority, recognising that at times it was necessary to defer to others. Peer reviewers spoke of deferring to other, more expert reviewers and also of regularly invoking the authority of editors, particularly in relation to classically "editorial" decisions.

> David [Reviewer]: Quite often it's more suggestions rather than prescription, I don't tend to be very prescriptive. The editors have to do that.

Editors who were less certain of their own authority spoke in detail about the importance of deferring to external reviewers (in part to justify their editorial decisions).

> Leslie [Editor-in-chief]: The primary decision-making is put in the hands of the experts: the board members and the reviewers they choose.

In addition to deferring to external reviewers, editors spoke about invoking the authority of their editorial colleagues, both formally and informally and clearly saw themselves as part of a decision-making collective.

> Karin [Full-time editor]: Each paper is like a patient. You get information from outside, you do your lab test, you do your X-ray, whatever. We are, as a collective, the person like the clinician who makes an assessment.

Editors also made it clear that they need at times to defer to their editors-in-chief, particularly when editorial decisions have been appealed. And, finally, editors noted that they placed some weight on the authority of their readers, who were expected to comment on published manuscripts, usually in the form of letters to the editor. It was, however, noted that in practice it can be difficult to elicit good post-publication commentary.

Our participants did not see these varying patterns of deference as a threat to high quality reviewing. Those who expressed high levels of deference were not concerned that they might be insufficiently involved in decision-making, and those who expressed low levels of deference did not see themselves as placing pride above objectivity. Indeed, participants seemed to take considerable pride in their humility (in the case of those with high deference) and their courage and sense of responsibility (in the case of those who were less deferent).

Appraisals and decisions are shaped by complex relations of power and vulnerability

Another factor that could shape a reviewer's or editor's appraisal, recommendation or decision was his or her sense of power and vulnerability in relation to others. While our participants were well-aware of the potential for conflicted reviewers and editors to use the review process to their own advantage, our participants seemed anxious to show that power relations in manuscript review are in fact not a simple matter of powerful editors and reviewers taking advantage of vulnerable authors. Indeed, in some circumstances authors were seen to be more powerful than reviewers (particularly junior reviewers) given their potential power to retaliate in future.

Authors were also seen to possess power over editors of even elite journals in the sense that they could decide whether to submit their manuscripts to a particular journal or to a competitor, and this could affect an editor's efforts to attract and publish particular authors and manuscripts. Editors also emphasised their dependence on their reviewers, even to the extent that editors may feel forced into giving special consideration to regular reviewers who choose to submit a manuscript of their own.

> Brian [Full-time editor]: Sometimes [a previous editor-reviewer relationship] makes it difficult to reject [a manuscript]. If they send a paper that isn't really that great, but they think it's brilliant (laughs), because you know them, it's harder.

While recognising that such preferential treatment could be ethically problematic, several editors saw this as a necessary evil given the current need for editors to attract both authors and reviewers and even as an action that is "only fair".

> Belinda [Full-time editor]: To be honest, I think that's fair. If we use somebody, and rely on people to do turnaround on reviews in 48 hours…then it's only fair that we review their paper, really.

Finally, editors spoke often of their dependence on material resources and the effects that this could have on their decision-making. Even editors of wealthy journals described the need to justify their editorial practices to their owners (e.g. commercial publishers) and to their subscribing readers.

As with considerations of epistemic authority, talk about complex power relations generally had a matter-of-fact quality. Practices that would potentially get in the way of purely objective review (e.g. privileging the work of regular reviewers) were seen as inevitable—and even virtuous—strategies in the context of complex and shifting relations of power and dependence.

Appraisals and decisions are shaped by moral considerations and personal relationships

The complex and shifting relationships among reviewers, authors and editors, also had a strongly moral, 'other-regarding', component which, like power relations, had the potential to shape judgments and decisions. While undoubtedly concerned about achieving the goals of scientific quality and dissemination, reviewers and editors were also very conscious of their personal relationships with authors, and of the need to enact a number of virtues and to fulfil certain associated responsibilities, each of which could shape the review of an individual manuscript. These included: 1) communicating clearly, consistently and in a timely manner, 2) reviewing kindly and constructively, 3) (in the case of editors), fulfilling pre-existing obligations to authors (e.g. where an author has previously reviewed for the journal) and 4) treating all authors equally (procedural fairness). Of course these moral considerations could conflict with each other and with the 'scientific' goals of review, as for

example when an editor or reviewer wishes to encourage revision without giving unrealistic hopes of acceptance, or when an editor needs to reject a manuscript that has been revised several times but is still scientifically flawed. In such cases, clear communication was seen to be essential:

> Gavin [Full-time editor]: It's essential that the letters inviting revision make it clear that submitting a revision does not guarantee acceptance. That's the main thing, because you don't want to mislead authors.

Authors, in turn, were seen as having reciprocal moral responsibilities of their own including a willingness to be 'disinterested' or to declare any competing interests, and humility and compliance in dealing with criticism, as these responses could shape the subsequent assessment of the manuscript and ongoing relationships with the journal and editorial staff.

> Karin [Full-time editor]: I sometimes find it very helpful to see how authors deal with criticisms. Whether they deal with it constructively or whether they just say: "This is completely unfair". Because authors need to deal with any criticism constructively.

Appraisals and decisions are often "biased" and "intuitive"

Many participants made it clear that, despite all efforts to make the review process objective, this goal may not be achievable in reality because of unavoidable personal and communal preferences and conflicts. Indeed, several editors spoke of *deliberately* seeking biased reviews so as to obtain particular critical or supportive perspectives.

> Glen [Full-time editor]: Sometimes I'll intentionally pick people who I know are going to have a strong view, maybe even someone I know that has a strong view against a particular area to see what the strongest argument could be made against it.

Furthermore, it was noted that bias might be essential for achieving the mission of a journal.

> Simon [Full-time editor]: [Describing the review of work from the developing world] It's positive discrimination, and positive discrimination is wrong, in my view. It shouldn't be allowed in my view. BUT, you have to. Things aren't black and white like that.

In terms of the method of manuscript review, reviewers' and editors' judgment was portrayed not as only as 'scientific' in the sense of being explicit, methodical, critical and productive of claims that can be explained and justified, but also as a process of deliberation

that may be habitual [Celia], intuitive [Louis], intangible [Penny] and not impossible to be completely articulated.

> Celia [Reviewer]: People get into habits of doing things in certain ways. That's the way that people get used to presenting themselves as reviewers and the voice that they get used to inhabiting as a reviewer…

> Louis [Part-time editor/reviewer]: [As a reviewer] Occasionally, there's an intuitive recognition that this is a review which is really worth writing, a sense it is intuition playing itself out.

> Penny [Full-time editor]: In the end, you can almost tell by looking at the title sometimes. You just look at it, and think, "Mmmm". Some of it's a bit intangible.

Like bias, these 'intuitive' reactions were only occasionally perceived to be failings of the review process.

> Sarah [Part-time editor/reviewer]: [Describing her reaction to qualitative research] All my sort of quantitative instincts go: "No, No!". I have rejected (without sending for review) the n=2. I can't do it. I just can't do it! (laughs)

More often, they were seen as sophisticated responses (not unlike the reasoning of experienced, expert clinicians) [Karin], which may be useful in the detection of, for example, well-disguised fraudulent research [Penny].

> Karin [Full-time editor]: If I went on a ward as a (clinician), and I looked at a (patient), I sometimes could tell by my experience, just looking at this (patient), this (patient) is very sick. It's knowledge, experience and sometimes even some intuition, (that) makes me say that and therefore react in a different way.

> Penny [Full-time editor]: You can't detect fraud. (But) sometimes reviewers do say things like, "These results are too good to be true", and it kind of flags up.

Intuition and reflection were not mutually exclusive, and several participants described their process of listening to their intuitions and then trying to engage in a more reflective process.

> Interviewer: How long does it take you to form an opinion on a paper?

> David [Part-time editor/ reviewer]: Pretty quick, but I go right through it, and read it a few times and look at it every which way, and start to do that process.

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DISCUSSION

This study demonstrates that, in the evaluative culture of biomedical manuscript review reviewers and editors strive to be as 'scientific' as possible. It is also clear, however, that biomedical manuscript review is a highly social and subjective process driven by communal as well as scientific goals, and influenced by reviewers' and editors sense of their own authority, power, and moral responsibility, as well as by unavoidable prejudice and intuition. Moreover journal editors and reviewers are generally accepting, and often proud, of the social and subjective dimensions of the process—not simply equating these aspects of review with ignorance, weakness or self-serving bias on the part of reviewers and editors.

Resonance with other research into peer review

This research extends the qualitative study of journal peer review beyond the examination of language or criteria used by reviewers and editors, and provides more context for, and detail about, the attitudes and opinions expressed in surveys of editors, reviewers and authors. In so doing, our research provides a greater understanding of why the review process is as it is, why particular issues arise, and how the resulting complexities are conceptualised and addressed by working editors and reviewers.

While we are not aware of any similar published studies, these findings do have resonance with unpublished work by Callaham and Tercier. Echoing our findings relating to motivations for reviewing and moral obligations, they found that while it was important for peer reviewers to objectively ensure that only high quality research was published, reviewers were also concerned about stifling innovation, wished to be part of a collaborative dialogue and expressed a strong sense of duty towards their author peers. (Tercier & Callaham, 2007a, b).These findings also have resonance with Lamont's (Lamont, 2009) qualitative research into the multi-disciplinary review of research grant applications. Lamont observed that reviewers from different disciplinary cultures measured excellence in different ways and that there were disciplinary differences with respect to how reviewers conceived of power dynamics, consensus and the effects of subjectivity on the quality of review. Despite these differences, panellists adopted a pragmatic approach to evaluation, developing a shared set of criteria as deliberations proceeded. This was facilitated by the development of a shared set of customary rules of deliberation such as maintaining collegiality, deferring to expertise, observing disciplinary sovereignty, bracketing self-interest, promoting pluralism and using epistemological standards appropriate to the project under review. This allowed panellists to build trust amongst themselves and to allow all voices to be heard (particularly in the context of differing types and levels of expertise) and to understand their choices as fair and legitimate.

Theoretical and practical implications

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Theoretical implications

There are two broad ways in which these findings could be interpreted. On the one hand, our participants could be viewed as naïve in their appreciation of the social and subjective dimensions of their work. Alternatively, our participants could be viewed as sophisticated observers of, and participants in, the peer review process. This latter interpretation would be in keeping with insights from the sociology and philosophy of science which have clearly shown that scientific knowledge, method, practice, research, communication, decision-making, and norms are all socially constructed and deeply intersubjective (Richards, 1987). Indeed, given this, it would be surprising if the process of journal peer review which is, after all, a key part of the scientific process, through which scientists develop their paradigms, define and fulfil their social norms (particularly those of self-regulation and organised scepticism) and establish their professional and vocational identities, was not social and subjective.

Practical implications

There are several possible practical implications of these findings. It could be argued, for example, that efforts should continue to mitigate or eliminate the non-'scientific' dimensions of manuscript review. Alternatively, it could be argued that this is an impossible feat, and that the social and subjective dimensions of the process are such an impediment to objectivity that the process should be abandoned altogether and perhaps replaced entirely with post-publication criticism. Alternatively, the argument could be made that one should look beyond the stated objectives of review and appreciate the other roles it plays in, for example, the legitimation of disciplines and in the construction of disciplinary identities (Tercier & Callaham, 2007b). We would argue for a different approach: one that not only acknowledges, but actually embraces the social and subjective dimensions of manuscript review. We would argue for this approach, not only because these dimensions of human relationships and personal judgments are unavoidable, but also because they are valued by those involved in the manuscript review process and because their presence is likely to enrich and improve the quality of the review process, rather than simply threaten it. The main danger, we would argue, lies not in the social and subjective aspects of review *per se*, but rather in the fact that they are generally discouraged and, with the exception of financial conflicts of interest, largely hidden from view. In this regard, we are in agreement with Michele Lamont that review is not simply a "cognitive process corrupted by extra-cognitive factors" (Lamont, 2009) (p157) and that trying to remove the social and subjective entirely from evaluation is doomed to failure (Lamont, 2009).

A dialectical approach to manuscript review

How then might we account for both the 'scientific' and social/subjective dimensions of the review process? One way of doing so may be to apply 'dialectical thinking' given that dialectics refer to both the ontological idea that all complex psycho-social realities contain within them potentially polarised elements (Westphal, 2005) and to a process of reasoning

about these complex realities, which overcomes both formal dualism and monistic reductionism and involves explicit thinking in terms of contradictions (Flak, Nordheim, & Munkvold, 2008). Dialectical thinking can, in turn, be translated into a dialectical method which accounts in practice for all dimensions of complex processes such as manuscript review. (**Figure 1**). (Dialectic in this sense needs to be distinguished from dialectic as a form of communication involving dialogue between people who hold different ideas and wish to persuade each other). Importantly, dialectical reasoning does not privilege one pole over another, and in this context entails simultaneously embracing two views of expertise and epistemic authority.

Please insert figure 1 here

We believe that a dialectic approach to manuscript review could generate both conceptual and structural changes. At a conceptual level, journal editors and reviewers, could be made aware of *all* of the social and subjective dimensions of their reasoning and encouraged (or at least given permission) to reflect upon the ways in which their reasoning (or, in the case of editors, their reviewers' reasoning) might have been socially and subjectively shaped. They may therefore ask themselves the following:

> 1. What is my main aim (or combination of aims) in reviewing this manuscript? (e.g. quality control, dissemination of ideas or assisting the author/contributing to the discipline?)
>
> 2. What do I perceive my role (or combination of roles) to be in carrying out this review? (e.g. suggestions, recommendations or a final decision?) To whom (if anyone) might I wish to defer and why? Who should be deferring to me?
>
> 3. Is my assessment being shaped by a sense of vulnerability or dependence upon others? Is there anything (e.g. resource limitations) or anyone (e.g. a more senior author) preventing me from giving a sufficiently thorough or critical appraisal?
>
> 4. What are my major moral concerns (e.g. fairness, consistency, reciprocity)? What expectations do I have of the author/s (e.g. willingness to respond to criticism)?
>
> 5. What, if any, prejudices (positive or negative) might be shaping my assessment including, but not limited to, financial conflicts of interest? Am I taking into consideration factors such as the stated mission of the journal, or the desire to assist disadvantaged authors?
>
> 6. What was my immediate, 'intuitive' or emotional reaction to the manuscript and how (if at all) was this altered by subsequent reflection?

Of course not all editors and reviewers would wish to answer such questions and not all editors would be interested in their reviewers' answers (perhaps preferring reviewers to reflect privately and produce a standard review), and care would need to be taken when transmitting this information to authors.

In the longer term, more radical structural changes to the review process might include: 1) efforts to tap into reviewers' desire to contribute to their communities and to reduce the sense of coercion experienced by some reviewers (e.g. by making manuscript review a more

genuinely rewarded component of academic life); 2) attempts to address *all* of the potentially distorting power imbalances in the review process, rather than focusing solely on outright abuses of power on the part of reviewers and editors (e.g. finding ways to make editors less dependent upon their reviewers and submitting authors and on the resources of their journals); and 3) strategies to tap into the moral inclinations of editors and reviewers which, interestingly, appear to stem not from formal editorial rules and regulations (which were hardly mentioned at all by our participants) but rather from spontaneous inter-subjective engagement.

Superficially, these recommendations do not look particularly different to those already suggested by people wishing to change and improve manuscript review. The difference lies in the epistemic rationale behind these changes and the attitude taken towards their implementation. Whereas others have suggested these strategies as a way of making the review process more 'scientific', we see them as ways of (also) embracing the social and subjective dimensions of the process. To take the question of reviewer anonymisation as an example, it is frequently argued that the manuscript review process should be opened up so as to make reviewers visible and contain their undesirable conflicts of interest and biases. According to this line of reasoning, manuscript review is rife with abuses of power and it is argued that, rather than promoting integrity, allowing reviewers to act "under the cloak of anonymity" insulates reviewers from accountability, leading to laziness, irresponsibility, failure to suppress whims and self-interests, and even to outright abuses of power (Godlee, 2002). Similar arguments are made for efforts to standardise practices across journals or even automate the process entirely, for providing reviewers with more training in scientific appraisal, and for having reviewers declare conflicts of interest, all of which are justified on the grounds that manuscript review needs to be a less biased and idiosyncratic (i.e. a more 'scientific' and less social/subjective) process. While we are not against any of these strategies, we would argue that they need to be viewed not only as ways of exposing and taming the non-'scientific' dimensions of the process, but also as ways of facilitating its social and subjective dimensions. To return to the issue of anonymisation, for example, we would argue that, if manuscript review is to be 'opened up' (i.e. made more 'dialectic' in the communicative sense) this should be aimed not only at making biases and conflicts of interest more visible and abuses of power less likely, but also at facilitating relationships among reviewers, editors and authors which might, in turn, encourage participation in the review process and strengthen moral engagement between reviewers, editors and authors.

Limitations and future directions

This overview of the social and subjective dimensions of manuscript review provides a solid starting point for further research into the workings of the journal peer review process. It would be important to explore further the extent to which these findings are predictive and generalisable (including to other forms of peer review such as the review of clinical trial protocols, ethics review and the review of applications for academic promotion). As Lamont has observed, academic excellence is produced and defined by many actors in many sites and there are likely to be differences between uni-disciplinary and multi-disciplinary groups of reviewers, and between reviews carried out in private and those carried out by face-to-
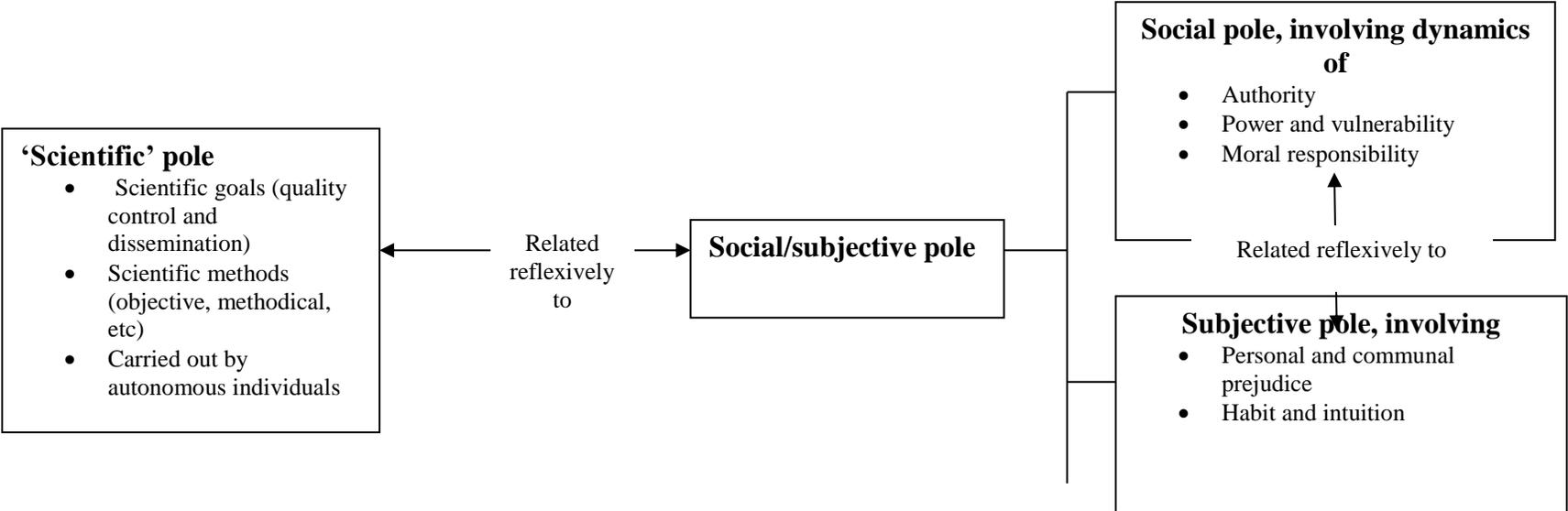
face review panels (Lamont, 2009). A number of threads identified in this research seem particularly worthy of further empirical examination, including the 'intuitive' aspect of manuscript review and the ways in which the many moral and epistemic challenges of manuscript review are negotiated. It would also be important to conduct a larger study to enable the identification of differences between, for example, senior and junior reviewers and editors, reviewers and editors of different kinds of journals, and reviewers who have and have not also acted as editors (and vice versa). While our aim in this research was to produce a general typology with heuristic value, it is possible that some points in our analysis will prove to be more salient to some groups than to others, and that some points will be made more emphatically and authoritatively by some groups than by others.

Ultimately it would also be important to assess whether the suggestions in this paper actually improve the quality of manuscript review: that is, the capacity of review to consistently ensure the quality of the research record and promote the dissemination of important and innovative ideas. We are cautiously optimistic that, embracing the legitimacy of the system *as it is* will both motivate participants and help them to define acceptable behaviour, thus having a positive impacton the review process. If, however, there continues to be no evidence of the effectiveness of manuscript review despite ongoing efforts to understand and improve the process, then it would be necessary to seriously question the place in academic life of *any* kind of peer review including, but not limited to, pre-publication manuscript review.

Conclusion

This research has generated a detailed description of the scientific, social and subjective dimensions of the biomedical manuscript review from the point of view of those involved. This, in turn, provided the basis for a dialectical account of manuscript review that captures and gives equal value to both its 'scientific' and social/subjective dimensions. While further research is necessary in order to establish the impact of the strategies outlined here, we suggest that until the inevitability and value of social and subjective aspects of manuscript review are fully acknowledged, we will severely limit our range of possible responses, and efforts to inform or improve the manuscript review process will make little progress.

Figure 1: A dialectical view of manuscript review

Social pole, involving dynamics of
- Authority
- Power and vulnerability
- Moral responsibility

'Scientific' pole
- Scientific goals (quality control and dissemination)
- Scientific methods (objective, methodical, etc)
- Carried out by autonomous individuals

Related reflexively to

Social/subjective pole

Related reflexively to

Subjective pole, involving
- Personal and communal prejudice
- Habit and intuition

American Medical Association. American Medical Association.

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