"Thank you for your critical comments and helpful suggestions": compliance and conflict in authors' replies to referees' comments in peer reviews of scientific research papers

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Abstract

Peer reviews of research papers submitted to journals are an "occluded" genre (Swales, 1996) - referees are usually anonymous and the confidential reports themselves are not part of the official record of research publication. Thus, compared to the published, readily available genres of the academy, there are few opportunities to study gatekeeping discourse such as peer reviews, nor are there many opportunities for novice researchers to practice framing appropriate and effective point-by-point replies to criticisms. This paper is part of a study based on the analysis and functional description of comments from a corpus of referees' reports and authors' replies. The data highlight the importance of authors being able to recognize and interpret the relative interactional/interpersonal vs. technical/ideational orientation of requested revisions, in order to revise successfully their papers after peer review.

Research on publication productivity in the sciences has emphasized the importance of early productivity as a strong predictor of future publication (Fox, 1983). When young scientists take up their first academic position, publication levels are initially more affected by the productivity of the pre-doctoral years than by the prestige of the new department and institution. In a "reinforcing process of advantage" (Fox, 1983:293), those who have published early will often continue to do so for several years until the supportive research environment of their present location will more strongly affect continued productivity.

KEY WORDS: PEER REVIEW, SCIENTIFIC DISCOURSE, GENRE ANALYSIS, SYSTEMIC-FUNCTIONAL LINGUISTICS

Introduction

Research on publication productivity in the sciences has emphasized the importance of early productivity as a strong predictor of future publication (Fox, 1983). When young scientists take up their first academic position, publication levels are initially more affected by the productivity of the pre-doctoral years than by the pres-

tige of the new department and institution. In a "reinforcing process of advantage" (Fox, 1983:293), those who have published early will often continue to do so for several years until the supportive research environment of their present location will more strongly affect continued productivity.

The processes of international scientific publication naturally represent additional challenges for NNSE (non-native speaker of English) researchers and they are of particular concern for those involved in supporting the research writing activities of NNSs of English, through their diverse roles as authors' editors or as teachers of specialist courses in English for Academic Purposes (EAP) to graduate students who will need to publish in the dominating international medium of English. Amongst many other potential barriers to success in academic/professional life, a lack of cultural awareness of review and publication procedures, and of course of linguistic expertise in demonstrating that awareness, is likely to hinder young NNSE researchers' early productivity. The term "cultural awareness" is used here in a broad sense; it includes not only awareness of L1-related contrastive rhetorical issues which may impact on the L2 writing process and the written product (Connor, 1996), but also importantly awareness of the workings of the culture of science and cross-cultural aspects of scientific research communication and episodes of social interaction between participants, such as peer review.

The term "peer review" has been applied to different instances of academic evaluation. Johnson (1992) studied compliments and politeness strategies in peer reviews written by graduazte students of each other's midterm papers. How praise and criticism are dealt with in published peer reviews of academic books (Hyland, 2000), as well as critical speech acts in medical journal book reviews (Salager-Meyer, 2001) have also attracted interest. Clearly, in comparison with these genre varieties, a major distinction of peer reviews of research papers submitted to journals is that they are examples of an "occluded" genre (Swales, 1996), that is, they are intended to be confidential, referees are usually anonymous, and the reports themselves are not part of the official record of research publication. Consequently, compared to the published, readily available standard genres of the academy, there are few opportunities for discourse analysts to collect and study relevant features of peer reviews of research papers, such as how the anonymity of referees might affect the act of evaluation. Nor are there many opportunities for novices to rehearse framing appropriate and effective point-by-point replies to this primary exemplar of gatekeeping discourse. Making the process yet more complicated is the fact that there are no standardized approaches to the form or content

of peer reviews. Different cultural backgrounds, different disciplines and sub-fields, journals and publishers, and professional organizations all add to the diversity of guidelines regarding peer review practices.

Although peer review is a contentious issue which has attracted much attention in the professional science literature, particularly in the health sciences[1], Kourilová (1996) is to my knowledge the only major study of communication strategies in peer reviews of scientific articles which has been applied to LSP contexts. Adopting a framework of analysis based on politeness theory (Brown & Levinson, 1987), she looked at the organization of compliments and criticism and at the frequency of face-threatening acts in a corpus of peer reviews of 80 manuscripts written by NNSE scientists. In comparing the "on-record criticism" of peer reviews with published scientific discourse, she found that the reviews were "less polite", with 4.5 times as many blunt as mitigated criticisms, which was principally assumed to be due to the anonymity afforded to referees, the difference in power between reviewers and authors, and the fact that reviews are not published.

As part of a broader ethnographic study of research communication, this paper aims to add to Kourilová's work on peer review. The specific objectives are (1) to elucidate the range of comments contained in a corpus of authors' point-by-point replies to peer reviews of their research papers and (2) to examine how conflict of opinion between authors and referees was handled in papers that were initially judged 'unacceptable'. Of pragmatic interest is how authors comply with referees' revisions to their manuscripts to make them more acceptable for publication. To elucidate this question we need to understand better the motivation behind referees' comments and the nature of conflict that may arise between authors and referees. More rooted in ideology than pragmatism would be the initiative to understand better current peer review processes in order to question their continued relevance, effectiveness, and fairness, especially in relation to rapid changes and developments in print and electronic publishing.[2]

The study

Background
This study is based on a corpus of a set of 40 peer reviews, or as labeled here, "referees' reports" (RRs) of manuscripts submitted to a scientific Letters journal,

and the resulting authors' point-by-point replies (PPRs), which are the main focus of interest in this paper. First, I will give some relevant background information relating to the form of scientific research articles known as "Letters" and to particular aspects of the review process of Letters, followed by details of the corpus on which this study is based. Some of this background material comes from interviews with a member of the Letters journal's advisory editorial board, as well as details which are published in the journal's "Guidelines and Instructions to Authors".

Although the modest size of the corpus on which the study is based only permits generalized comments about authors' PPRs to RRs, one distinct advantage of the corpus is its relative homogeneity. We are focusing here with material arising from submissions to only one specific journal, i.e., one scientific sub-discipline with a narrow scope of interest, with its relatively uniform review procedures and requirements concerning the preparation and formatting of manuscripts.

The Letters journal

In different scientific fields, short technical papers are known variously as Letters, Research Notes, Rapid Communications, Brief Reports, etc. The main concern of journals such as *Physics Letters*, *Chemistry Letters*, and *Letters in Applied Microbiology* is the rapid publication of new and urgent findings - this process can take often just one to two months from initial submission to publication. Given these objectives, the length of short papers such as Letters is strictly limited and the review process has to be streamlined in order for scientists to be able to establish priority for their research claims in fast-moving branches of fields such as physics, chemistry, and microbiology (Hyland, 2000). The present data come from the review of submissions to an international Letters journal with its main editorial offices in the UK and USA which publishes approximately 30 papers weekly in English, limited to 2500 words in the field of chemical physics.

The local review process

Given the emphasis on rapid publication, the Letters journal has regional advisory editorial boards in 20 countries worldwide to handle "local" submissions – here, I am dealing with papers submitted to a member of the advisory editorial board in Japan. In the "Key Guidelines for Authors", the journal requests that manuscripts should preferably be sent to a member of the board "who is familiar with the

research reported", although in practice this was unlikely to be outside of one's own local (L1) scientific community, if possible. Referees requested by the advisory editor to review papers may be local researchers (L1 Japanese) or NSs of English from institutions outside of Japan. However, English was used for all official journal correspondence, which included referees' reports, authors' responses with re-submissions, and editorial records and correspondence.

As is common practice in many scientific fields, referees would know the identities of the authors and their affiliations from the submitted manuscripts and covering letter. However, at the same time, authors were invited by the Letters journal to suggest the names of three appropriate referees. So although the review process was described as "anonymous" (the referees know the authors' names), rather than "blinded" (neither party knows) or "open" (both parties know), the fact that authors were invited by the journal to suggest suitable referees leaves this question uncertain.

Referees' guidelines
The Letters journal advises referees that particular emphasis should be placed on the following points: originality of research, desirability of quick publication, clarity of presentation, and validity of conclusions. The journal did not use a standardized pro-forma for referees' comments, but regarding the overall judgement of the paper, the given categories to be marked ("tick one box") were: "outstanding", "acceptable", "marginal", or "unacceptable". Referees were requested to return reports along with manuscripts within two weeks.

Review procedure
The journal states that "all contributions will be refereed". The initial screening by the advisory editor was followed by technical review by usually two external referees, but sometimes by one external referee and the advisory editor. If re-submitted, the advisory editor would decide for papers initially marked "accept after revisions" whether the authors had satisfactorily addressed referees' questions. If yes, the paper was usually marked "accept for publication" by the advisory editor. If not, the paper would be returned for a second or even third review to the same referee(s), who could also insist that they re-review revised manuscripts themselves. For papers initially marked "marginal" or "unacceptable", if re-submitted, they would automatically go back to the same referees for further review.

Data collection

I approached a local advisory editor I had already known for several years for an interview and after explaining my specific research objectives, I asked whether I might have access to a corpus of referees' reports and authors' point-by-point replies. I was handed a cardboard box with 21 envelopes, comprising the editor's most recently completed "batch" of submissions, completed in that they had either been through the full review process and had been accepted for publication, or the papers had been withdrawn by the authors after review. Envelopes were chrono-logically ordered by date of original receipt in the editor's office, and I kept to this simple arrangement for the purposes of numbering referee's reports and authors' replies in my corpus. Thus, it can be concluded that there was no actual gathering, selection, or randomization of data involved in the corpus of papers.

The corpus

The corpus consists of 40 referees' reports and associated authors' point-by-point replies, where attached upon re-submission. These 40 reviews are divided into two groups depending on the initial judgement of referees regarding their suitability for rapid publication:

<u>Group I</u> consists of 22 RRs of 15 papers (labeled 1 to 15) which were initially marked "accept with revisions". In all 15 cases, the revised versions of the manu-scripts could be accepted for publication. For Group I papers, the average time from receipt of paper to acceptance for publication was 14.6 weeks.

<u>Group II</u> consists of 18 RRs of 6 papers (labeled A to F) which were initially deemed "unacceptable" by referees. A later section below deals with the review history of these papers.

Comments in referees' reports

Categories of referees' comments

In order to understand the motivation behind authors' PPRs, it is necessary to give a brief overview of the rationale behind the comments in RRs which they were required to address. Gosden (in preparation), based on the same corpus, gives fuller details and analysis of the range of comments made by referees in their reports. For the present purposes, they can briefly be classified as below. Bold figures in brack-

ets indicate percentages of total comments (N=272) for each sub-category noted in the corpus of peer reviews.

- Discussion – referees asked for (a) further explanation in order to improve readers' confidence in the results or to clarify explanations "so as not to confuse readers". Particularly in papers marked "unacceptable", referees noted (b) that discussion was poor and unclear, and appeared irritated by the lack of clarity; (33.8%)
- Technical detail – referees pointed out (a) technical errors or inconsistencies, or (b) asked direct or implied questions to elicit further Technical Detail; (26.9%)
- Claims – referees disagreed with the strength of (a) individual specific claims or (b) overall claims. In general, claims were expected to be weakened to become acceptable; (19.8%)
- References – referees indicated (a) specific references that should be added in order to acknowledge other researchers' related work, or (b) pointed out errors in existing references with referees adding corrections. In papers marked "unacceptable", additional references were often pointed out (c) to highlight that the substance of the authors' research may already have been reported elsewhere (even by themselves), and therefore served to cast doubt on the originality of the paper under review; (12.5%)
- Format – referees questioned whether the Letters journal was the appropriate place to publish the paper and suggested that the manuscript (a) should be shortened because of the 2500 word limit of a Letter format, or (b) should be expanded to make a full paper for a different journal. (c) Comments also concerned individual sections of the paper. (7.0%)

In addition, as we are dealing with submissions from NNSE researchers, another feature of referees' comments was reference to problems with English Language. Often the reports themselves may have only referred to problems annotated "in red ink" on the returned manuscripts. Although any comments on "the English" are obviously important with EAP concerns in mind, they were not counted in this study towards the totals of comments or percentages given in brackets above.

The relative ideational vs. Interpersonal orientation of referees' comments

In order to elucidate the overall balance between referees' comments which focused on the topic-based, technical subject matter (*ideational*), and those which highlighted the interactional nature of the "dialogue" between referees and authors as participants (*interpersonal*), comments can be organized as realizations of Halliday's (1985) metafunctional categories.[3]

    Ideational: Technical Detail = 26.9%

    Interpersonal: Claims (19.8%) + Discussion (33.8%) + References (12.5%) = 66.1%

    Textual: Format = 7.0%

The categorization of Technical Detail and Format are straightforward. The categorization of referees' comments relating to Claims, Discussion, and References under the Interpersonal metafunction can be justified in that such comments reflect the social construction and negotiation of the originality and value of authors' research, as well as reflecting the appropriate rhetorical expression demanded in convincing readers of that value.

Hyland (2000) noted that because they serve to negotiate social interactions, peer reviews (although he was talking about published book reviews) are interactively complex, carefully balancing the "good news/bad news" orientation of praise and criticism. Kourilová's (1996) study, dealing with unpublished reviews as in the present corpus, reported that although omission of data (here labeled Technical Detail - ideational) was the most frequent target of criticism, that of unjustified conclusions (Claims/Discussion – interpersonal) appeared to be the most severe. In comparison, although Technical Detail was indeed significant as the second largest single category (26.9%) of referees' comments in the present data, grouping the comments by Halliday's metafunctional category as above highlights the tension inherent in balancing the relative ideational and interpersonal orientation of authors' replies. Indeed, with two-thirds of all referees' comments in the corpus oriented towards interpersonal/interactional concerns, we can appreciate more clearly the greater rhetorical weight of requested revisions.

Authors' point-by-point replies

Although journals and publishers do not use standardized formats for referees' reports, letters of response tend to mirror the general three-part structure of

reports, in particular with numbered point-by-point replies to questions and queries:

• Opening remarks
• Numbered point-by-point replies
• Closing remarks (optional)

Even when their paper has been rejected, when having to address harsh criticisms, or when there is a degree of sarcasm in referees' comments, opening remarks are typically highly formulaic, with authors thanking the referees for their comments:

   - 'Thank you for your critical comments and helpful suggestions'.

In papers marked "accept with revisions", opening or occasionally closing remarks typically indicate that authors have been able to follow most or all the recommended changes.

   - 'We have done our best to rewrite our article according to your suggestions.'
   - 'We believe we could reply to your questions.'

At this stage, if authors' priorities are to get into print as painlessly as possible, they will of course acquiesce to referees' wishes, and there will be little of any polemical nature to discuss. This acknowledgement of the respective roles and relative status of "vulnerable" author and "powerful" referee (Riis, 1994) in this unequal exchange of "peers" is evidently an important ritual in the publication process. By serving as referees, this ritual is seen as an intrinsic part of the "reward system" for academics and professionals as their seniority develops through involvement at different levels of academic evaluation.

Categories and examples of authors' point-by-point replies:

As indicated above, the functional range of authors' replies needs to reflect closely referees' original comments. These can be summarized as follows and are illustrated with examples taken from the present corpus.

• Technical detail – correction and addition: authors (a) corrected an error that had been pointed out or (b) answered a referee's direct or implied question intended to elicit further Technical Detail (+TD):

   (a) 'There is an error in Eq.6. (+TD) has been omitted.'
   (b) 'The line width of the laser was 0.07Å.'

• Discussion – clarification: authors attempted to make their explanations clearer for readers:

   - 'Experimental methods are described in more detail on p.3.'
   - 'To avoid the misunderstanding pointed out by the referee, I would like to omit the sentence describing (+TD).'

- Claims – downgrading: authors accepted referees' suggestions or stronger requirement that individual claims were to be softened:
  - 'I changed the statement to be weak. Please see page 14.'
  - 'The proposal was withdrawn of the change of (+TD).'
- References – addition and correction of references as indicated by referees:
  - 'Two recent papers are added to ref. [5] and [14].'
  - 'We overlooked the recent paper by (+ reference).'
- Format – challenge: referees had questioned whether the submission was suitable for the journal, given certain limits, such as word length in a Letters journal, or the desirability of urgent publication - in general, authors were likely to withdraw their papers and submit elsewhere. Individual sections of papers may also have been targeted:
  - 'First, we have to answer your question "Is this work suitable for a letter?" (+TD)'
  - 'I shortened the Introduction.'
- English Language: authors responded to comments on "the English" in the manuscript:
  - ' The manuscript was improved in the technical English according to your suggestions.'
  - 'Typographical and stylistic changes: The manuscript was corrected or changed following the red ink notes in the manuscript.'

Referees' unsolicited help was frequently acknowledged - in response to the question "If manuscripts are recommended for publication, are they returned with suggested language corrections by referees or [editors]?", Gosden (1992:128) noted in a survey of NSE journal editors that only 4% said "no".

In summary, it is vital that when re-submitting papers after technical review, authors should indicate clearly how in the revised manuscript they have addressed referees' criticisms. It is unlikely that this process of acknowledging referees' status can be circumvented without cost. Even if editors did not wholly agree with criticisms, they would not expect authors to ignore referees' concerns without good reason. Since authors are expected to have scrutinized carefully referees' comments, their point-by-point replies need to be structured so that on re-submission, editors and referees will quickly be able to assess revised manuscripts, check the itemized changes that have been made, and thereby establish whether they are then satisfied.

Where submissions are to journals which specialize in the rapid communication of new data, such as Letters journals, it is even more vital that replies in authors' letters of response are well organized and targeted.

The review history of 'unacceptable' submissions

In the 15 papers marked "accept with revisions", all authors complied fully with no issues of major conflict. In contrast, of the 6 papers initially marked "unacceptable", only one (here, labeled Paper A) was revised to the satisfaction of the referees/editors and eventually accepted for publication. Interestingly, the fate of the other five rejected papers, after a computer search by title and first-named author, could not be determined which implies that the technical content and/or format of those papers was considerably re-worked due to the reasons for rejection:

Paper B was considered too long for a Letters journal, at 4300 words, nearly twice the advised limit. Paper C "showed promise" but it was recommended that the authors complete a more detailed study. The re-submitted version of Paper D did not address referees' specific criticisms, which provoked harsher criticism in the second review than in the first. Papers E and F were judged as "not relevant" and as having "minimal findings", respectively. Clearly, conflict occurs between authors and referees for various reasons - looking in closer detail at the review history of one paper will help reveal the nature of balancing compliance and resistance to criticisms.

Paper A - Referees' reports: #1
It was perhaps potentially confusing that Referee I labeled this paper "interesting", "carefully studied", and "sound enough", but then commented that the basic idea underlying the research "could "hardly be understood". Referee II could not "appreciate the originality of the research and therefore the necessity of quick publication" (as a Letter) and commented that statements were "too ambiguous to permit claiming anything meaningful".
Paper A – Authors' point-by-point replies: #1
After the first review, authors' PPRs indicated that their paper was revised following many of the referees' comments. However, at the same time, authors strongly challenged at some length some of the referees' opinions:

- 'Probably, Referee I expected that (+Technical Detail). However, it is not always the case.'
- 'We cannot understand Referee II's comment that (+TD).'
- 'However we do not agree with his judgement because (+TD).'

Disagreements about the merits of the paper were quickly personalized. Authors questioned the referees' competence to judge their research, suggesting that the non-blinding of the identities of the authors and their affiliations had affected referees' judgements:

- 'Since judgement on the significance of the paper is a delicate problem dependent on personalities, we explain only (+TD).'
- 'It is natural that (+TD) is a strange matter for a reader who is not an expert in (+TD).'

Looked at in isolation, some of the authors' comments even read in places as if they were themselves part of a technical review of referees' work:

- 'Judging from the context, Referee I seems to believe that (+TD). However, this is not necessarily the same (see authors' reference).'

Paper A - Referees' reports: #2

On re-submission, Paper A was re-reviewed by the same two referees. It was still found "unacceptable" by referee I; referee II upgraded it to "accept after revisions". Not surprisingly, in their second reviews, both referees commented, somewhat frustrated, on authors' attempts to personalize what they insisted were purely technical issues:

- 'The lengthy narrative in the form of the authors' remarks against the reviewer's suggestions evidently lacks pertinency. Things are by no means a matter of "personality" or "expertness" of anybody. Instead the authors should have just appreciated the reviewer's pointing out of the missing minus sign in eq. 3 and explained plainly how (+TD).'

Equally damaging and clearly irritating for referees – evident from the underlining and the use of exclamation marks - was the perception that authors had misquoted or misinterpreted comments in referees' first reviews:

- 'The authors answered "we cannot understand Referee II's comment that (+TD)." I don't understand at all where they found that sentence!!'
- 'It is very regrettable that the authors are distorting my comment purposely.'
- 'I didn't write that their paper included no new results and hence their paper was not acceptable.'

Paper A – Authors' point-by-point replies: #2

The paper was revised with authors' return PPRs clearly indicating their own somewhat combative personal style of continued compliance and resistance to suggested changes:

- 'We have removed Figure 2, as referee I suggested; however we left the section on (+TD), because it will contribute to the approach by other researchers who are devoted to (+TD).'

Paper A – Referees' reports: #3

Referee I, who had marked Paper A "unacceptable" reviewed the paper for a third time and at this stage criticized primarily the presentation of the paper with its many "unsuitable" and "fuzzy" expressions in English "which may confuse the reader" - consequently the paper was now marked "accept after revisions in English".

Paper A – Authors' point-by-point replies: #3

On submission of the fourth revised version, authors thanked referees for their "critical comments on the linguistic problems" of the manuscript. The authors now wished to stress that these problems had been resolved through consultation "with a colleague who had stayed in the USA as a research fellow for about 8 years". However, in keeping with the authors' argumentative stance towards referees, the aforementioned colleague was now mobilized as support to justify their reluctance to make a number of linguistic changes:

- 'We and our colleague do not consider the beginning two lines on p.3 are very fuzzy expressions. We have only replaced "monitor" with "study".'

Paper A - Referees' reports: #4

On receipt of the revised version, the advisory editor marked the paper "accept for publication".

After reading the above exchanges of correspondence, some may be surprised that Paper A was published at all, or indeed submitted 4 times to the same journal, given the degree of commitment required from both parties throughout. Since the Letters journal does not have a policy of blinding reviews, one can only speculate that the particular style of conflict pursued throughout the review process of Paper A reflects on participants' - especially authors' - perceptions of the appropriate levels of politeness phenomena (Brown & Levinson, 1987), namely, of the relative power

of referees over authors, of the social distance between them, and of the ranking of the imposition involved in face-threatening acts. More concretely, we can say that, from the original date of receipt of the paper by the journal, the review process had taken some 25 weeks, compared with the average of 14.6 weeks for the Group I corpus, and far from the 5 to 8 weeks mentioned by Hyland (2000) as being often the case with "rapid publication" Letters journals.

Concluding remarks

Bearing in mind the "occluded" nature of peer review, Enckell's (1999) advice to referees indicates the likely consequences of the unusual linguistic task that many NNSE researchers are faced with in trying to produce effective and appropriate replies to referees' reviews:

Try not to let the author's possibly halting command of the English language influence your impression of the quality of the study itself... What is more, their response to your critique may be even more difficult to understand, since they might have had linguistic help with the manuscript but possibly not with their letter of response. (1999, p. C6:2)

For those involved in supporting the research writing activities of non-native speakers of English, the present study indicates that one important focus of "linguistic help" is for novices to recognize the relative technical vs. interactional nature of comments in referees' reports. This in turn may help them to interpret effectively the socio-rhetorical purposes behind many of the comments classified in the present corpus as interactional/interpersonal. It is important for all authors to understand when and how to comply with requested revisions, and where appropriate, to resist by defending their original statements, since the unsatisfactory re-submission of manuscripts will usually prove detrimental to the continued successful engagement between authors, editors and reviewers.

1. In the experience of the Letters journal advisory editor in question, he had never come across "blinded" reviews in his field. He took the often heard line that, without anonymity, referees would make much milder comments which would lower the standard of the journal. However, other journals have started to take different views and encourage correspondence between named referees and authors where there is disagreement about knowledge claims in manuscripts. As might be expected, arguments for and against such sentiments run the whole gamut within professional scientific associations. A special issue of *The Journal of the American Medical Association (JAMA*: Vol. 280, Nº 3, 1998) published 33 papers from an international Peer Review congress (www.jama-peer.org) on such issues. Salager-Meyer (2001) has further useful references on this subject - see also Goldbeck-Wood (1998, 1999), Smith (1999), Godlee & Jefferson (1999) and the websites www.bmj.com/cgi/collection/peer_review and www.wame.org

2. *European Science Editing*, published by the Bulletin of the European Association of Science Editors (www.ease.org.uk) is a useful source of information on where to locate websites and articles in journals such as *Nature* and *Science* which discuss issues such as the future of print and electronic publishing, and how e-publishing may affect the peer review process.

3. See Gosden (1995) for a related report on how Halliday's metafunctions are applied to the categorization of revisions between drafts of research articles.

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