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'Nowhere has anyone attempted . . . In this article I aim to do just that' A corpus-based study of self-promotional *I* and *we* in academic writing across four disciplines

Nigel Harwood *

Department of Language and Linguistics, University of Essex, Wivenhoe Park, Colchester CO4 3SQ, UK

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Abstract

This paper is a qualitative corpus-based study of how academic writers can use the personal pronouns *I* and *we* to help to create a self-promotional tenor in their prose. Using a corpus comprising journal research articles (RAs) from the fields of Business & Management, Computing Science, Economics, and Physics, I present data extracts which reveal how *I* and *we* can publicize the writer and their work even though the pronouns are ostensibly helping to perform other functions, such as creating a research space, organizing the discourse, outlining procedure and/or methodology, explaining the researcher's previous work, reporting or summarizing findings, disputing other researchers' findings, or indicating potential future directions for research. The study shows that even supposedly 'author-evacuated' articles in the hard sciences can be seen to carry a self-promotional flavour with the help of personal pronouns.

Keywords: Academic writing; Pronouns; Self-promotion; Self-citation; 'Author evacuation'; Corpus-based linguistics

* Tel.: +44 1206 872 633; fax: +44 1206 872 198.
E-mail address: nharwood@essex.ac.uk.

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1. Introduction

This paper is a corpus-based qualitative study of how journal writers in four disciplines use *I* and *we* in a self-promotional fashion, where the personal pronouns publicise the writer and their work. There have been a number of papers focusing on the effects personal pronouns help to construct in academic prose (e.g., Harwood, in press-a, b; Hyland, 2001; Kuo, 1999; Tang and John, 1999; Vassileva, 1998), although none to date have focused exclusively on this promotional effect. And while arguably the most influential study, Hyland (2001), analysed a corpus of eight disciplines across the spectrum, three of the four disciplines in the present study, Business & Management, Economics, and Computing Science, were not included in Hyland's corpus. The aim of the present study, then, is to provide a more detailed analysis of how pronouns can self-promote than has been conducted hitherto, as well as to investigate this promotional tenor in academic writing in disciplines which have not been analysed for this effect. After a look at some of the sociology of science literature which accounts for the academic writer's need to self-promote, I briefly review the analysis done by other corpus linguists on *I* and *we* in academic prose (an analysis which shows that personal pronouns fulfil a number of functions), before focusing on what these other analysts have said about self-promotional uses in particular. I then offer my own analysis, outlining the procedure and methodology behind the construction of my corpus of academic articles, before describing a number of self-promotional effects and illustrating these with extracts from my data. In line with previous research, the analysis reveals that many of the passages rely on more than the pronoun to construct a promotional tenor, and I include a discussion of cotext in my analysis.

2. The traditional view of academic writing

The academic prose of hard scientists has traditionally been seen as ''author-evacuated'' (Geertz, 1983). Gilbert and Mulkay's (1984) analysis of biochemistry articles illustrates the point well. Gilbert and Mulkay note how the scientists' impersonal style of writing objectifies their research in order to ''construct texts in which the physical world seems regularly to speak, and sometimes to act, for itself''. Prose written in this fashion ''denies its character as an interpretative product and . . . denies its author's actions are relevant to its content'' (p. 56). The traditional view of scientific writing, therefore, is that it simply reflects indisputable 'facts' which have been proved by replicable empirical investigation (Mulkay, 1979). Gilbert and Mulkay's interviews with the authors of the biochemistry articles they studied confirm this (artificial) construction of objectivity, since the biochemists are aware of the fact that their supposedly factual work may later be falsified by others. The impersonality of their writing serves to act as a kind of insurance policy:

> 'Everybody wants to put things in the third person. So they just say, 'it was found that'. If it's later shown that it was wrong, don't accept any responsibility. '*It* was found. I didn't say I *believed* it. *It* was found.' So you sort of get away from yourself that way and make it sound like these things just fall down into your lab notebook and you report them like a historian. . ..' (Gilbert and Mulkay, 1984: 58)

On the face of it, then, self-promotional personal pronouns may seem an odd focus of study since the impression conveyed by quotes like the above is that scientific prose is not inherently self-promotional. Academic writers protect themselves against falsification by distancing themselves from their findings and avoiding personal pronouns.

3. The need for the self-promotional in academic writing

A number of sociologists of science have claimed that writers have the need to promote their work and underscore its uniqueness. In Whitley's words, academics are seeking the reputation of ''novelty producers'':

> . . . a key feature [of the modern sciences] is their commitment to producing novelty and innovations. [. . .] Rather than simply reinterpreting and elaborating past wisdom, modern western science is oriented to the construction of new and better intellectual artefacts which transcend earlier understandings. Thus intellectual obsolescence is built into the knowledge production system and old knowledge is devalued by new developments. (2000: 11)

Berkenkotter and Huckin's (1995) longitudinal study of research articles (RAs) supports Whitley's argument by showing how important it is for writers to be seen as at the ''cutting edge'' of their fields. Analysing a diachronic corpus of RAs stretching over 45 years (1944–1989) to determine what features have changed over time, Berkenkotter and Huckin identify several self-promotional features which have become more marked, although they do not focus on personal pronouns. One such self-promotional feature is newsworthy titles in the hard sciences, which state or strongly imply the results of an investigation (as examples take two recent article titles from the prestigious journal *Nature*: *SOS response promotes horizontal dissemination of antibiotic resistance genes*, and *The gene product Murr1 restricts HIV-1 replication in resting CD4^{+}lymphocytes*). This type of title is on the increase, since in Berkenkotter and Huckin's 1944 subcorpus, less than a third of titles state or strongly imply results, compared to over two thirds of RAs in their 1989 subcorpus. Berkenkotter and Huckin (1995) conclude that ''[t]oday's scientists seem to be promoting their work to a degree never seen before'' (p. 43). This is thought to be at least partly because more research is being conducted now than at any time previously and it is harder to get people's attention in this crowded environment. It is probably also partly due to the fact that getting one's work accepted in the most prestigious journals in such an overpopulated arena appears to be ever harder. Journals are rejecting the vast majority of manuscripts submitted for publication—several of the editors of mainstream British and North American physics, chemistry, and biology journals Gosden (1992) corresponded with put the figure of papers rejected at over 70% of all submissions, while Swales (1990) claims that the figure is even higher in the arts and humanities at 80–95%. All of this helps to explain why the editors in Gosden's study admitted they were, in effect, ''looking for reasons to reject manuscripts'' (p. 129). So given that a failure to publish in the current climate may well jeopardize a scholar's prospects of promotion (cf. Flowerdew, 1999; Ventola and Mauranen, 1991), it would seem sensible to make a manuscript as novel and as newsworthy as possible.

To the social constructionists, then, academia is essentially competitive and conflictual: science has become part of a ''promotional'', ''consumer'' culture (Berkenkotter and Huckin, 1995: 43). Peers are described as ''colleague-competitors'' (Whitley, 2000: 25), and journal reviewers are described as ''pit bulls guarding the queen's jewels'' (Berkenkotter and Huckin, 1995: 75), blocking all but the most select pieces of research from being published in the top journals. Today's researchers are less preoccupied with the philanthropic advancement of knowledge and more with the aim of

> . . . convincing fellow researchers of the importance and significance of the results and enhancing [their] own reputations. [. . .] Reputations are won by persuading the relevant audience of the importance of one's work and so affecting their own priorities and procedures. (Whitley, 2000: 25–26. See also Bazerman, 1988: 294)

This quest for novelty has led some researchers (e.g., Haggan, 2004; Knorr-Cetina, 1981; Law and Williams, 1982) to describe the act of writing and publishing academic discourse in terms of marketing, advertising, and economics. Knorr-Cetina (1981) argues that scientists strive to transform laboratory work into something which becomes widely accepted as ''new'' in their writing, and that ''[e]very scientific choice (whether a method or a place of publication) can be seen as an investment strategy objectively directed at a maximisation of scientific profits, i.e., an increase in social authority and recognition'' (p. 22). And Haggan (2004), who, like Berkenkotter and Huckin (1995), analysed RA titles, likens the RA title to an advertisement, functioning to 'sell' the paper to the reader. For their part, Law and Williams (1982) speak of academic prose as a ''product''. The writer's aim is to make this product as ''attractive to, and usable by, other scientists'' as possible (p. 537). The reason for this is given by Latour (1987): the worst possible fate that awaits a paper is for it to be ignored. With more and more research being produced daily, scholars can only read so much; and unless the paper in question captures the readers' attention, and is cited in future studies, it will be as if it never existed at all. Like Gilbert and Mulkay (1984), therefore, Law and Williams go on to argue that the opening paragraph of an article is particularly significant in terms of marketing. The introduction of the RA constitutes ''a vital part of the packaging'', ''designed to alert potential users, to persuade them that this is a valuable product, one which they cannot do without'' (p. 539).

4. Personal pronouns in academic writing

A number of corpus-based studies have identified a range of functions that *I* and *we* can play in academic writing (e.g., Bernhardt, 1985; Harwood, in press-a, b; Hyland, 2001, 2002b; Kuo, 1999; Tang and John, 1999; Vassileva, 1998). Pronouns and possessive adjectives are said to help the writer organize the text and guide the reader through the argument (e.g., *First I will discuss x and then y*), state personal opinions and knowledge claims (*On the basis of my data I would claim*), recount experimental procedure and methodology (*We interviewed 60 subjects over the space of several months*), and acknowledge funding bodies, institutions, and individuals that contributed to the study in some way (*I thank Professor X for his help with the calculations*). In addition to performing

this range of pragmatic acts, personal pronouns can help to reveal how academic writers construct their relationship with readers and with their discourse community (Gragson and Selzer, 1990; Kuo, 1999). In their rhetorical analysis of two Evolutionary Biology articles, for instance, Gragson and Selzer (1990) argue that the effect of the heavy use of *I* by one of the writers to ''forecast his intentions or to sum up his conclusions'' (e.g., ''I have taken as my starting point . . . I first outline . . . I then discuss . . . I summarize and comment on.'') is to ''establish the author as the authority and the implied reader as the novice in need of direction'' (pp. 33–34). In contrast, the writer of the other Evolutionary Biology text is said to construct readers as disciplinary equals through their use of inclusive *we*. Other researchers have argued that while some uses of *I* and *we* are low-risk, discreet instances of textual authorial intervention, other uses, such as when the writer makes a claim, carry much greater threat to face, and are potentially points at which the writer exposes themselves to attack by the audience. Hence those who have constructed functional pronoun taxonomies (Hyland, 2002b; Ivanič, 1998; Tang and John, 1999) link pronoun functions with authorial presence. The visibility of the writer in their text will therefore depend upon the function of the pronoun in each particular case.

The next section focuses specifically on self-promotional *I* and *we* in RAs, identifying three distinct ways in which researchers have claimed this effect is accomplished.

5. Self-promotional *I* and *we*: other studies

5.1. Personalizing claims: the writer as authority and originator

The first way in which pronouns can be used in a self-promotional fashion is when writers market themselves and their research by constructing a picture of newsworthiness and uniqueness. It was noted above that Gilbert and Mulkay (1984) and Law and Williams (1982) argued that marketing of this sort is particularly common at the beginning of the RA. In Swales' (1990) terms, by creating a research space at the beginning of the RA, the writers show how their work differs from the work of everyone else, and thus why their work is worthy of attention:

> A problem that has not been studied in any detail is the nonuniformity of the longitudinal magnetic field of a z-gradient coil in the transverse (x and y) directions, which is associated with the elliptical geometry. *We* address this issue in the present paper. . .. (Physics RA) (Hyland, 2001: 219)

Pronouns link the researchers to their findings, showing that the writers are responsible for the claim. The effect can be to persuade the reader that the writers, like the claim they are putting forward, are worth taking notice of (Hyland, 2001; Tang and John, 1999):

> *We* have demonstrated a system capable of texture segmentation. . .. (Computing Science RA) (Kuo, 1999: 131)

> Finally, *we* believe that LEW satisfies better the important criterion of comprehensibility. . . (Computing Science RA) (Kuo, 1999: 132)

> *We* have demonstrated that MCP can be used to form single- and multiple-helical microcoils by printing lines on all objects. (Mechanical Engineering RA) (Hyland, 2001: 222)

So according to Tang and John (1999: 28–29), pronouns can help to identify the researcher as an ''Opinion-Holder'' and ''Originator'' of new ideas, accounting for Vassileva's (1998) claim that the pronoun usually combines with '' 'verbs of thinking and emotion', like *think, believe, feel, hope, fear*'' (p.170).[1] This originator effect may be especially pronounced when these assertions are particularly novel, or contrary to established practice (Raymond, 1993). The resulting tenor (which personal pronouns help to construct) is one of conviction and authority:

> However, *I* believe that this is a one dimensional view, in that sensations may well be necessary complements of emotion while not being the defining feature. *I* also think that sensations and perceptions are not simply natural phenomena that are closed off from cultural conditioning. . .. (Sociology RA)
>
> *I* suggest then that beyond reporting what research has taught us about the researched situation, we might also address what research has taught us about research. (Applied Linguistics RA) (Hyland, 2001: 221)

Hence possessive pronouns help researchers stress the ownership of their work, something that Hyland's researcher informants recognize as an important consideration:

> Using 'I' emphasizes what you've done. What is yours in any piece of research. I notice it in papers and use it a lot myself. (Interview with Sociology researcher)
>
> If there are good reasons for a particular interpretation, all the data point the same way to the same conclusion, then I'm happy to pin my colours to the mast. You have to make sure that what you've done gets noticed so that you get recognised for it. (Interview with Marketing researcher)
>
> Sometimes . . . you need to be explicit about what you think, that the contribution is your own. (Interview with Mechanical Engineering researcher) (Hyland, 2001: 217, 222–223)

And in the ultra-discursive discipline of Philosophy, where disputation is common, pronouns underscore the uniqueness of the writer's work by specifying their beliefs in relation to others' beliefs:

> The personal pronoun 'I' is very important in philosophy. It not only tells people that it is your own unique point of view, but that you believe what you are saying. It shows your colleagues where you stand in relation to the issues and in relation to where you stand on them. It marks out the differences. (Interview with Philosophy researcher) (Hyland, 2001: 217)

[1] Vassileva's claim can also be linked to a discussion of the importance of cotext in constructing a promotional effect (cotext is discussed later).

5.2. Procedural soundness and uniqueness

The second type of self-promotional pronoun occurs during the description of method. Researchers have noted that *I* and *we* in particular help the writer to describe or recount the research process (Harwood, in press-a; Kuo, 1999; Tang and John, 1999). However, this can be interpreted as more than a straightforward reporting of procedures: by using pronouns to highlight their own contribution to the work, writers can be seen to be advertising their worth as researchers. In the extract below, for instance, the fact that the writers were able to get round a methodological difficulty underscores their competence and ''the merit of their approach'' (Kuo, 1999: 125):

> In this work, *we* present an approach by which the present experimental restrictions can be overcome. (Physics RA) (Kuo, 1999: 126)

Similarly, pronouns can help the writers display their judgement while testing a hypothesis or conducting an experiment:

> *We* used a measure based on interlaced batches to compute an unbiased estimate S2 of the variance of the performance characteristic within a single run. . .. (Electronic Engineering RA)

By helping the researchers to describe their procedures in depth, *I* and *we* also mark the writers' methodology out as their own, highlighting its uniqueness:

> In 1995 *I* went to Mexico and Chiapas to better understand the Zapatista movement. *I* visited many people, men and women, from and around the movement, and discussed with them the questions treated in this article. *I* am formulating them as ''questions to Ramona''. (Sociology RA) (Hyland, 2001: 220)

5.3. Self-citation

One of the most obvious ways researchers can show that they deserve to be taken seriously is by alluding, via self-citation, to previous research they have done. Indeed, Hyland (2001) found that self-citation constituted around 60% of all cases of self-mention in his multidisciplinary corpus. In other words, in the majority of cases when researchers referred to themselves in their writing, they were referring to some previous work they had carried out. Although this is not necessarily achieved through the use of pronouns (which can be seen as overly face-threatening; Myers, 1989), pronouns can be used in the act of citing oneself (e.g., *I* show elsewhere in my earlier work (Smith, 1999) that. . .). As Hyland's informants make clear, reference to one's previous work is a powerful weapon in the quest for disciplinary ratification and credibility, showing that the researcher is in the vanguard of research and is working on issues which are preoccupying the discipline at the time of writing:

> Citing yourself is an important way of showing your familiarity with an issue. It shows you know what you are talking about and have something worth saying. (Interview with Biology researcher) (Hyland, 2001: 214)

I have thus far outlined the reasons why there can be said to be a need for the promotional in academic writing, and have identified three different ways in which researchers have claimed that this promotional effect is accomplished through the use of personal pronouns. However, I do not want to give the impression that any promotional effect is always entirely due to the pronouns. In many cases my analysis will show that the cotext also helps to market the text and the writer, and so this will be briefly discussed before proceeding any further.

6. Self-promotional pronouns and cotext

Hyland (2001) gives the following extract from his corpus which contains a personal pronoun which it is claimed helps to emphasize the writer's merit as a researcher:

> *I* reviewed the case material and found solid grounds for these activities. (Marketing RA) (Hyland, 2001: 220)

While it could indeed be argued that the pronoun is promotional here, it is also worth drawing attention to the contribution played by the phrase *solid grounds*. In Thompson and Hunston's (2000) terms, *solid grounds* can be seen as carrying positive evaluation, reflecting well upon the researcher. In other words, other language can work in concert with *I* and *we* to create a promotional tenor. The *cotext*—defined by Janney (2002: 458) as ''the immediate linguistic environment in which a unit of discourse . . . occurs . . . in a discourse sequence''—has a role to play as well as do the pronouns in the construction of the promotional. In my data analysis below, then, I begin by discussing extracts from my corpus where it seems that the promotional effect is achieved predominantly by means of a personal pronoun. I then go on to discuss extracts where the cotext also has a significant role to play. When referring to cotextual effects, I draw upon a range of literature, particularly literature referring to metadiscourse (e.g., Hyland, 1998; Vande Kopple, 1985, 1997; Williams, 1990), reporting verbs (e.g., Hyland, 2002a; Thomas and Hawes, 1994), and evaluation (e.g., Hunston, 1989; Hunston and Thompson, 2000; Thetela, 1997).

I now move on to my own study of pronouns, beginning with a brief account of the creation of my corpus of RAs.

7. Corpus and procedure

7.1. Analysing a disciplinary spread

To ensure that texts were analysed from a spread of subjects across the academy, Becher's (1989) taxonomy of the disciplines was used to decide corpus content. Becher divides the academy into soft and hard fields. To make a crude generalization, when we speak of the hard fields we are referring to the sciences, and when we speak of the soft fields we are referring to the humanities and social sciences. The soft and hard fields are then further divided into pure and applied

Hard-pure	*Soft-pure*	*Hard-applied*	*Soft-applied*
Physics	Economics	Computing Science	Business & Management

Fig. 1. The four disciplines represented in the corpus.

groupings. Very broadly, the pure fields can be said to be more 'reflective' and theoretical, while the applied fields are 'active' and practical. While Becher (1989, 1994) concedes that taxonomies such as these simplify what are in fact innumerable disciplinary differences, such schemes are meant to be illustrative rather than watertight, and can foreground important disciplinary similarities and differences that might have otherwise gone undetected.

It was decided that the corpus would consist of four different disciplines, one from each of Becher's categories. Hence my corpus represents the disciplinary spectrum as shown in Fig. 1.

7.2. Selecting the journals

Having selected the disciplines to be included in the corpus, the next stage was to select the journals from which the RAs would be chosen. A minimum of three lecturers in the four disciplines concerned were asked to nominate the three most prestigious journals in their discipline, and the two most popular nominations were chosen.[2] Where there was no clear consensus, more lecturers were asked to nominate until two journals received more nominations than any of their rivals. The journals which were nominated for inclusion in the corpus were as shown in Fig. 2.

Ten articles were selected in each discipline, making 40 in all. This study was part of a larger project comparing and contrasting pronoun use in journal writing with postgraduate student writing. Because the student writing was single-authored, in order to meaningfully compare *I* and *we* usage, all the journal articles selected for inclusion were also single-authored, despite the fact that in disciplines like Physics, multiple-authored articles are more common. The corpus ran to approximately 325,000 words. I refer to each discipline

[2] Given that this project was part of a larger study which sought to compare the most prestigious journal writing with the most 'successful' postgraduate student writing (a corpus of MA dissertations which had been awarded Distinction grades; see Harwood, 2003), it was important that the most highly esteemed journals were chosen. An anonymous reviewer made the interesting point that it was possible that because the corpus consisted of the most prestigious publications, the writers featured may be ' big names' in the discipline who are at liberty to act in a different way to their less acclaimed peers, thus including personal pronouns in their writing to an extent that their less recognized colleagues could not. However, what was admittedly a very limited investigation did not persuade me that writer status explains the appearance of personal pronouns in the corpus. The *Academy of Management Review* (which was in fact nominated by the management informants as the most prestigious journal in the field) helpfully provides a biodata of each contributor in the journal. It turns out that two of the five writers in the *Academy of Management* corpus (Bolino (B&M 6) and Frooman (B&M 7)) are in fact only PhD candidates. In addition, Pentland (B&M 9) and Swanson (B&M 10) are only Assistant Professors, and Griffith (B&M 8) is an Associate Professor. None of this indicates that any of the writers in the *Academy of Management* corpus are particularly big hitters in the field.

Hard-pure	*Soft-pure*	*Hard-applied*	*Soft-applied*
Physics:	Economics:	Computing Science:	Business & Management:
(1) *Physical Review*	(1) *American Economic Review*	(1) *ACM Transactions on Programming Languages and Systems*	(1) *Academy of Management Review*
(2) *Physical Review Letters*	(2) *Quarterly Journal of Economics*	(2) *Theoretical Computer Science*	(2) *Administrative Science Quarterly*

Fig. 2. Lecturers' top two nominations for the most prestigious journal in their discipline.

in the corpus by abbreviating as follows: B&M (Business & Management), COMP (Computing Science), ECON (Economics), and PHYS (Physics). So for example the eighth RA in the Economics subcorpus is denoted by the abbreviation ECON 8. Full details of the content of the corpus can be found in the appendix.

7.3. Building the corpus

The selected RAs were either obtained directly from the electronic versions of the relevant journals or manually scanned and converted to Text format. All abstracts, footnotes, endnotes, and reference lists were deleted, and the corpus was analysed using the WordPilot 2000 concordancer (http://www.compulang.com/). All occurrences of *I* and *we* had to be studied in context to ensure they were being used by the writer of the text and not by other parties like the writer's informants. In the following extract from a Business and Management article, for instance, the writer is quoting interview data, and the informants are using pronouns (reproduced here in boldface) to interact with the interviewer and to report what their colleagues said:

> Another member, Joe, described this phenomenon in similar terms, ''Our group is very good; if something comes back to us, **I** think all of us will say, 'Yeah, **I** did that.' **I** don't think there is any of us who wouldn't – where before it was, '**I** don't remember. . ..' Now **I** think everyone takes responsibility.''

Pronouns such as these were deemed irrelevant for the purposes of this study.

8. Data analysis

8.1. Self-promotion at the start of the RA

Like Gilbert and Mulkay (1984) and Law and Williams (1982), I found the beginning of the RA to be a prime site for self-promotion. After the writer has created a research space

(Swales, 1990) by stressing that there are gaps in the literature which need plugging, *I* and *we* can be introduced as self-promotional devices to underscore the novelty of the work in question. By using *I* or *we* to help state where they stand immediately, rather than arguing their case and stating their position near the end of the RA, the researchers promote their product by fronting it with an eye-catching claim (relevant pronouns boldfaced below):

> We do not seem to have [a] theory of how users initially comprehend the capabilities of a technology. The features-based theory of sensemaking triggers (FBST) **I** present here attempts to fill this gap. (B&M 8)
>
> . . .nowhere has anyone attempted to go beyond the listing and discussion of particular influence strategies to construct a model of those strategies. In this article **I** aim to do just that. . . . (B&M 7)
>
> The most commonly observed nonexponential response has (<1, and non-Arrhenius activation behavior has T0 >0, but there is still no widely accepted explanation for either formula. Here **we** extend standard mean-field theory to mesoscopic systems and obtain a partition function for supercooled liquids. (PHYS 2)
>
> Young [15] and Cao and Irani [3] considered the general case of arbitrary costs and sizes. This allows the modelling of network bandwidth costs, access latency, etc. in a distributed information retrieval system such as the World Wide Web (WWW).
>
> In this paper, **we** extend these results to allow each page to be assigned an expiration time at the time it enters the cache. (COMP 6)

Hence the most newsworthy, marketable elements are flagged up with the help of pronouns, fitting in neatly with Law and Williams' (1982) claim that the opening paragraph of an article is a vital part of the promotional packaging which helps alert the readership to novelty.

A similar marketing tactic can be read into phrases like *as we will/shall see*. Although their ostensible purpose is to act as discourse guides, orienting the reader and preparing them for what is later to follow, these phrases can also be read as more promotional devices, foregrounding the novelty of the findings and encouraging the audience to read on:

> As **we** will see, these processes provide strong bounds on the effective Planck scale which are essentially independent of the number of extra dimensions. (PHYS 2)
>
> The general division problem involves a numerical system of linear equations. However, **we** shall see that the complete solution of this system is unnecessary. (COMP 9)

Moving on to an analysis of some of the passages where I claim that the cotext, as well as the personal pronoun, plays a prominent part in constructing a promotional tenor, the marketing element of the extract below is particularly explicit, in that the writer's findings and results are announced from the start:

> **I** find that rigid rules increase the probability of contract breach by more than 50 percentage points; however, **I** also find that rigid bidding reduces prices by about 18 percent for the most commonly awarded contracts. (ECON 6)

The cotext helps to market the paper's findings (and the paper's writer) because *I* is found in combination with the phrase *more than*, an example of what metadiscourse researchers have called 'boosters' or 'emphatics' (e.g., Hyland, 1998; Nikula, 1996; Stainton, 1993; Vande Kopple, 1985, 1997; Williams, 1990). Boosters are said to heighten the confidence and conviction of a claim, and in this case can be seen as helping to emphasize the novelty of the author's findings. Other instances of 'marketizing' boosters (*not only . . . but also*) and of lexical items like *valuable* (which metadiscourse researchers call attitude markers), were also found in the corpus as part of the cotext surrounding promotional pronouns. In Thompson and Hunston's (2000) terms, lexical items like *valuable* convey positive evaluation, casting the researcher in a positive light:

> Thus, **I** seek not only to explore the impression-management motives underlying citizenship but also to examine the outcomes of citizenship in this context. (B&M 6)

> **I** use certain dimensions of technology features to connect a technology with sensemaking triggers. [. . .] **I** anticipate that a features-based approach will provide a valuable unit of analysis. (B&M 8)

Not only . . . but also stresses how much the writer has accomplished, while *valuable* underscores the worth of the research to the wider community.

Another type of self-promotional passage involving cotext that sometimes occurred at the start of the RAs in the hard disciplines contained a personal pronoun/reporting verb combination, specifically a research act reporting verb (Hyland, 2002a; Thomas and Hawes, 1994), like *demonstrate*, *show*, and *establish*. The effect is to flag up the researchers' worth by linking them with their (noteworthy) data:

> Collisions in the second class are treated by introducing a phase-coherence length. This latter is introduced and defined in Sec. II of this paper, where **we** calculate its effect on partial reflection of an electron beam at a single potential step. **We** show, via this example, that even though phase coherence is lost, particle conservation is still maintained. [. . .] Additionally, **we** prove that the resonance structure is degraded both by net capture and by phase-coherence loss, two independent processes which contribute additively to the degradation of the resonances. [. . .] **We** give other numerical results that illustrate various aspects of the theory developed in the preceding sections. (PHYS 6)

> For the Tevatron **we** show the sample case of Ms = 800 GeV and the sign ambiguity in λ is visible in AFB. For the LHC **we** display the effects of a Ms = 2.5 and 4 TeV string scale on the lepton pair invariant spectrum (with the smaller string scale having the larger effect). (PHYS 3)

8.2. Self-promotion at the close of the RA

By heavily marketing their research from the start, writers can be seen to be alerting the community to the novelty of their work. Interestingly though, the fact that claims are promoted at the beginning of the RA does not stop the same writer summarizing his

findings at the close as well, as in the extract below, where the writer opens up by announcing their contribution to the discipline thus:

> We do not seem to have [a] theory of how users initially comprehend the capabilities of a technology. The features-based theory of sensemaking triggers (FBST) **I** present here attempts to fill this gap. (B&M 8)

At the close of the article, this claim is repeated:

> This article offers a technology features-based theory of sensemaking triggers (FBST) to describe how users initially make sense of a technology. In eight propositions **I** describe how two dimensions of technology features (concrete versus abstract and core versus tangential) trip Louis and Sutton's (1991) sensemaking triggers (novelty, discrepancy, and deliberate initiative).

Hence *I* and *we* help researchers to close their RAs by underscoring the groundbreaking aspects of their work:

> This study provides the most comprehensive statistical evidence available on the effect of rigid evaluation systems on contract performance and price. **I** find that rigid competitive solicitations increase the probability of breach by more than 50 percentage points. (ECON 6)

> In this paper, **we** have extended recent results on paging with varying costs and sizes to handle an additional feature of World Wide Web caching mechanisms, namely that of data that expires and must be refreshed. The model for data expiration is derived from that used by several popular proxy caching systems [5,10,12]. This is the first theoretical treatment of this problem **we** are aware of. (COMP 6)

As with the instances of *we shall see* discussed above, some of these self-promotional pronouns which close an RA could be seen as having the function of orienting the reader and making the text more accessible, succinctly stating what has been achieved. However, it is the exclusive rather than inclusive *we* that is being used in the examples here, and the primary purpose is surely to underscore the writer's unique contribution to the discipline:

> In conclusion, **we** have studied the indirect effects at high energy colliders of a TeV string scale resulting from new large extra dimensions. **We** derived the form of the interactions of the massive KK gravitons with the SM fields, examined their effect in $2 \rightarrow 2$ processes, and found that present colliders can exclude a string scale up to $\sim$1 TeV and that future colliders can extend this reach up to several TeV. (PHYS 3)

While many of the extracts above feature cotextual reporting verbs which arguably work in tandem with pronouns to construct promotion, the final extract discussed in this section is an example of how *I* and *we* can combine with boosters near the close of the RA. A boosting phrase (*at the very least*) is used with *we* to promote how much has been accomplished by the research:

> Hence, **we** have achieved, at the very least, an accurate analytic representation of the thermodynamic functions of Pu at the temperatures cited. (PHYS 10)

Having shown how *I* and *we* can promote the writer both at the start and at the close of the RA, I move on to the promotional self-citation in the next section of my analysis.

8.3. Self-citation and self-promotion

Given the preference for the Harvard System of referencing in the soft disciplines, instances of self-citation are highly visible. The researcher in the following extract (an economist called Edward P. Lazear) mentions his own work near the start of the RA and in the literature review:

> **I** have argued elsewhere that the strength of economic theory is that it is rigorous and analytic (see Lazear [1995], Chapter 1). But the weakness of economics is that to be rigorous, simplifying assumptions must be made that constrain the analysis and narrow the focus of the researcher. (ECON 5)

The promotional effect achieved by the combination of the pronoun and self-citation would seem to operate on at least two levels here. On the one hand, if the readers are new to Lazear's work, their awareness has been raised of the body of other work available by the same author. On the other hand, Lazear is demonstrating that he is an established player in the field, with a number of publications already under his belt. And where others' work is often cited to create a research space by revealing the inadequacy of knowledge in the field, in the extract below the effect of self-citation is rather different:

> . . .in a recent study of hospital patient-care teams, **I** found significant differences in members' beliefs about the social consequences of reporting medication errors; in some teams, members openly acknowledged them and discussed ways to avoid their recurrence; in others, members kept their knowledge of a drug error to themselves (Edmondson, 1996). (B&M 2)

Since the RA will focus on team learning, the author's previous findings are cited to show the subject is worthy of investigation and deserves to be taken further—which conveniently happens to be precisely what the writer is doing!

Although one of the two Computing journals in the corpus, *ACM Transactions on Programming Languages and Systems*, uses the Harvard System of referencing, the hard fields tend to prefer the Footnote System. As a result, citations appear in the form of a number in square parentheses (e.g., [3]). Because the author's name is not included in the main body of the text, then, the self-citation will be less visible. However, personal pronouns were also found in combination with self-citations, with the same promotional tenor as a result. In the examples below, the pronoun/self-citation achieves two separate effects. On the one hand, it makes audience ratification more likely by quoting research which has already been published, and therefore already accepted to some degree by the community (cf. Gilbert's (1977) idea that self-citation of 'valid science' increases the chances of acceptance). The fact that the writer is building on their own earlier work should mean that a certain credibility is automatically conferred on the present research. On the other hand, the pronoun/self-citation strengthens the writer's profile as a player in the field. The following extract is typical:

> In a recent study, **we** applied these ab initio techniques to the case of SiGe superlattice structures with a variety of substitutional defects situated adjacent to the interfaces. [2] [. . .] These results indicate that the . . . microscopic properties of the interface itself, the ''intra-facial'' properties, could provide the mechanism for the luminescence features observed in SiGe quantum wells, and opens up a new framework within which to understand the optical spectra and transport properties of heterostructures. (PHYS 9)

The researcher's previous study (cited as [2]) ''opens up a new framework'' for the community, and is used as partial justification for the present research.[3]

Similarly, pronouns in concluding sections also help writers to promote their claims by demonstrating that their research can be used as a springboard for work in related areas:

> Currently, **we** are using the Specware system to formally specify bytecode verification and synthesize an algorithm from that specification [Coglio et al. 1998]. The synthesized verification algorithm directly corresponds to that in the current paper. . .. (COMP 4)

In addition, there were a number of instances in the corpus where I felt that the cotext worked in concert with a self-citation and promotional pronoun to market the text and the writer. The first passage considered here uses lexis which carries positive evaluation (*insight, richer, realistic*) to achieve this effect. The writer (Nechyba) claims his previous research has led to an advance in knowledge, justifying further investigation. Again, the pronoun can be read as a self-promotional vehicle which links the researcher with this step forward in disciplinary knowledge. The writer's methodology is said to be superior to that of his peers, providing *a richer and more realistic model*:

> The resulting forces are quite basic and emerge in Nechyba (1999a): Private schools tend to form in low-income districts in part to serve middle- to high-income immigrants who move to take advantage of lower house prices. [. . .]
>
> Given this insight, **I** focus here on the potential importance of residential mobility by employing a richer and more realistic model than that used in prior work and by embedding a state finance system that mirrors one that is in practice. (ECON 7)

Similarly, another case of self-citation has *we* combining with *recently*, a lexical item which carries particularly positive connotations in a fast-moving hard discipline like Physics, in which it is important that the community is aware of the latest developments:

> Recently, **we** presented a series of ab initio pseudopotential calculations demonstrating the differentiation of interface type, and supporting the hypothesis that localized interface-related states are formed at perfect InSb-like interfaces. [3] (PHYS 9)

The personal pronoun combined with the self-citation ([3]) helps to promote the researcher as someone in the vanguard of advances in knowledge.

[3] The phrase ''opens up a new framework'' is also positively evaluative cotext. Further extracts where the cotext is prominent are discussed below.

The author of the next example exploits self-citation in a slightly different way, although the self-promotional tenor which results is the same:

> This Hamiltonian, together with phonon statistics, provides the theory for the free-energy of crystals. [10] Over the years, **we** have extended and refined the theory of thermodynamic functions of crystals. [5,11] (PHYS 10)

Note how the self-citation and pronoun are followed by reporting verbs carrying positive evaluation (*extended, refined*), suggesting that the researcher has been producing notable research for an extended period (*over the years*), and is therefore an established figure in the field.

In summary then, in all cases of self-citation considered here, whether from the soft or hard ends of the scientific spectrum, the authors can be seen to be constructing themselves as masters of their discipline with the help of *I* or *we* and also at times with the help of the cotext. While it is true, as Pichappan and Sarasvady (2002) argue, that self-citation can be seen to achieve a number of effects apart from self-promotion—in the extract above, for instance, the self-citation arguably helps to alert the reader to the writer's previous work—this does not mean that the self-citation, in conjunction with the pronoun, is not also self-promoting.

The cases of *I* and *we* in the next section help to highlight disagreements between the writers' findings and the findings of others in the discourse community. The effect is to underscore the novelty and newsworthiness of the writers' work, and, I argue, to promote the writers themselves.

8.4. Self-promotion via disputation and the marking out of difference

Although outright criticism of another's claims is face-threatening, and is therefore normally avoided (Bloch and Chi, 1995; Myers, 1989), there were some instances of differences of opinion found in the corpus which featured *I* and *we*. In the extract below, *I* is combined with the hedge *suggest* to tone down the face-threatening act (FTA) of disagreement with the other researcher:

> Wood (1994) has suggested various categorization schemes for these stakeholder interests, including concrete versus symbolic, economic versus social, and local versus domestic versus international. There is no doubt that the lists and sorting schemes are important. **I** suggest, however, that although simple in concept, the mere recognition that stakeholder and firm interests do diverge is as important a step toward managing stakeholders as is identifying and classifying those interests. (B&M 7)

Despite the toning down of the FTA, however, the passage can be read as promotional: by stressing the writer's departure from earlier research or from other researchers' ideas and methods, the pronoun helps the writer underscore the novelty of his own work.

It will be noted that nowhere in the extract above does the writer directly claim that the other researcher's work is invalid. However, the following extract is far more face-threatening, naming another researcher and featuring a negational citation (Moravcsik and Murugesan, 1975):

> In addition, **we** can find no evidence in our calculations for the presence of the critical point reported by Magro near 11 000 K. [11] (PHYS 8)

The fact that this passage comes near the close of the RA lessens the FTA to the writer somewhat (although not to the other researcher named). This is because the writer's own results have already been presented, which should afford some degree of protection, justifying the claim that his findings are at odds with the other writer's. The self-promotional effect *we* helps to construct is the result of this contradiction. The writer has modified the discipline's collective knowledge, and the pronoun links the writer with his innovative claim. Hence *I* and *we* can help to promote writers by means of what I have called *the marking out of difference*.

Further extracts which mark out difference where the cotext plays a more prominent role are now discussed. In the passage below, the threat to the face of the researchers who are being attacked is lessened by the writer's refusal to name names, taking issue instead with the agentless *most of the previous work*. At the same time, however, the cotext helps to construct an undeniable element of self-promotion running through the passage, accomplished via the use of personal pronouns, attitude markers (*interesting*), and boosters (*even*):

> It is interesting that, as opposed to most of the previous work, **we** will obtain non-trivial results even in the case where the pool consists of a single expert. (COMP 10)

The final extract discussed here has the author taking issue with another party over methodological procedure, using a booster/attitude marker phrase (*more powerful*), as well as lexis carrying negative evaluation (*suspect, bias*) to cast her own method in a favourable light while the other researchers' method is found wanting. The pronouns help the writer highlight the advantages of her preferred method—and indirectly promote her own worth:

> Angrist and Lavy [1999], for instance, are able to do only some of the desirable discarding because their cross-section data contain too few occurrences of enrollment in the right ranges. Below, **I** present cross-section results that demonstrate what happens as one discards more and more of the suspect observations. Since my data are actually panel data, **I** am able to employ a within-district method (described below) that is more powerful and less subject to bias than the cross-section method. (ECON 3)

The next set of examples of *I* and *we* which are analyzed function to describe procedure and/or methodology. I claim that procedural pronouns can promote writers in three distinctive ways.

8.5. Procedural I and we

8.5.1. Methodological innovation

Rather than neutrally recounting facts, the extracts in this group can be seen to carry self-promotional overtones because the pronouns link the researcher with their groundbreaking methodology (cf. Harwood, in press-a; Hyland, 2001; Kuo, 1999). In all of the data discussed here, the cotext surrounding the pronouns plays a significant role in constructing this promotional effect. For instance, the phrase *I develop(ed)* is sometimes used to indicate to the reader that they can expect innovative research procedures:

> **I** developed scales to measure team psychological safety and team efficacy, using items designed to assess several features of each theoretical construct. (B&M 2)

> To provide structure for the empirical work, **I** develop a simple three-region model characterized by migration and transport costs. (ECON 8)

Alternatively, sometimes writers use pronoun/attitude marker combinations to market the benefits of their chosen methodology. Note the repeated use of the positively evaluative attitude marker *nice* in the following:

> One nice consequence of using population variation is that the range of class size for which **I** obtain estimates is the range that is relevant for policy. Another nice consequence is that **I** observe schools functioning under the incentive conditions that they normally experience. (ECON 3)

The author is then honest enough to acknowledge her approach brings with it a drawback as well, helping to promote her as a researcher of integrity.[4] Her reaction in the face of this drawback constructs methodological legitimacy and rigour as she promises she will *discuss the issue carefully*:

> In short, these facts suggest that the transitoriness of small class size due to population variation should not be a problem, but **I** discuss the issue carefully in interpreting my results. [4] (ECON 3)

8.5.2. Avoiding methodological pitfalls

The second set of examples featuring *I* and *we* which help describe procedure, while also helping to promote the writer, are used alongside tricky research decisions. The impression conveyed is of the disciplinary expert skirting potential methodological pitfalls:

> It was important that my framework add to theories of organizational behavior, but **I** did not want my framework to unduly distort the actual experiences of Amway distributors. To help ensure that **I** accomplished the latter goal, **I** discussed and modified the framework based on conversations with key informants. (B&M 4)

> There are three estimation issues. First, since the data are differenced, we expect no individual-specific fixed effects to remain. Breusch-Pagan Lagrangian multiplier tests confirm this expectation. Second, the variance of the disturbance term may vary across age-education groups. In the results **I** present robust standard errors, which allow for clustering around the age-education groups and account for this potential heterogeneity. (ECON 8)

> For an accurate determination of the theoretical quantities, **we** need to remove the thermal expansion contribution to the Primary thermodynamic data. To do this, **we** choose a reference volume V0 for each phase, and make a small correction of the

[4] Of course this acknowledgement can also be read as a hedge to protect her from attack—and thus as a necessary device rather than an optional one which only the diligent would include.

primary data to obtain S(V0, T) and U(V0, T) at the fixed volume V0 for each phase. (PHYS 10)

Passages were found in my corpus which used cotextual boosters and evaluative lexis to underscore the formidable nature of the difficulties the writer had to face in ensuring the chosen methodology is sound. In the extract below, for instance, these difficulties are flagged up by the booster *crucial*. Having outlined two alternative techniques to solve a methodological problem, the writer says:

In both these methods, a crucial detail has been glossed over. (COMP 2)

This detail results in what the writer labels as the negatively evaluative *problems*. In the face of this adversity, then, the next pronoun is self-promotional, helping to show how the writer overcomes these difficulties:

We satisfy both problems by showing that the greedy algorithm given can be used to construct a conditional total order. . .. (COMP 2)

8.5.3. Methodological rigour: going the extra mile

The final set of examples featuring *I* and *we* used in describing procedure which are discussed here can help to construct a research methodology of diligence and rigour, and an image of a researcher who is prepared to go the extra mile in the quest for sound data. All of these extracts feature cotext which has a significant role to play in the construction of this effect. For instance, boosters often combine with the first person to construct a similar image of the ultra-conscientious researcher. Note the use of *at least*, *as many as*, *only*, and *as well* in the following extracts:

I interviewed at least one and as many as six members of each team, as well as one senior manager responsible for reviewing the work of one of the product development teams. (B&M 2)

I can show only a fraction of the specifications **I** estimated. (ECON 3)

The two identification strategies are independent of one another and provide a check on one another's results. **I** provide a number of other specification tests as well. (ECON 3)

The impression created is that the research would have been judged to be of sufficient rigour by the community's gatekeepers even without this extra diligence. This diligence is sometimes constructed by combining *I* or *we* with the phrase *for the sake of completeness*. Again, the implication is that the extra analysis involved was not strictly necessary. The effect is to portray the researcher as someone unwilling to cut corners:

For the sake of completeness **we** consider here the case of division by a reducible quadratic divisor which is the square of a linear factor $B(x) = (x - a)^2$. (COMP 9)

To conclude, with the help of *I* and *we* all of these passages strive to give the readership confidence that they are in safe hands. The researchers are using techniques that are methodologically sound, and they are at pains to emphasize that they have resisted the temptation to take shortcuts.

9. Summary

While this study has taken a qualitative rather than a quantitative approach, I have shown that the pronouns *I* and *we* which help to promote authors and their work are found in both the hard and soft disciplines.[5] Such promotional devices can market the research from the start, underscoring novelty and newsworthiness in the introduction as they help create a research space. They can also help repeat claims and findings at the close, to show that the work deserves to be taken seriously, and that, by extension, the author deserves to be seen as a player in the discourse community. Pronouns can be used by writers to self-cite, which can alert the readership to the body of work the same researcher has already produced, while also constructing novelty and credibility, since the writers are shown to have had their earlier work ratified by the community's gatekeepers and readership as a whole. *I* and *we* can also help writers make a name for themselves by disputing others' claims, by marking out the difference between the writers' stance and that of their peers. Finally, although pronouns which help the writer describe their methodology and procedure may seem unlikely tools for self-promotion, *I* and *we* can stress the writers' procedural innovations, highlight how methodological pitfalls were successfully circumvented, and record how the writers were more rigorous in their quest for sound data than was strictly necessary.

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Appendix A. Corpus contents

	Coding
BUSINESS & MANAGEMENT	
1. Bartel C.A. (2001) Social comparisons in boundary-spanning work: effects of community outreach on members' organizational identity and identification. *Administrative Science Quarterly* 46: 379–413.	B&M 1
2. Edmondson A. (2001) Psychological safety and learning behavior in work teams. *Administrative Science Quarterly* 46: 350–383.	B&M 2
3. Lounsbury M. (2001) Institutional sources of practice variation: staffing college and university recycling programs. *Administrative Science Quarterly* 46: 29–56.	B&M 3

[5] An anonymous reviewer's comments convinced me that a few quantitative observations were advisable here. Although *I* and *we* are not in fact used by every writer in the corpus to refer to themselves, just two of the 40 texts in the corpus contained no cases of *I* or *we* used in this way. The texts were a Physics text (PHYS 1) and a Computing text (COMP 7). Thirty-five of the 38 texts which feature pronouns contain pronouns which I judge to be promotional. The texts which feature only non-promotional pronouns are two Economics texts (ECON 2 and 10) and a Computing text (COMP 8).

4. Pratt M.G. (2000) The good, the bad, and the ambivalent: managing identification among Amway distributors. *Administrative Science Quarterly* 45: 456–493. B&M 4
5. Zuckerman E.W. (2000) Focusing the corporate product: securities analysts and de-diversification. *Administrative Science Quarterly* 45: 591–619. B&M 5
6. Bolino M.C. (1999) Citizenship and impression management: good soldiers or good actors? *Academy of Management Review* 24(1): 82–98. B&M 6
7. Frooman J. (1999) Stakeholder influence strategies. *Academy of Management Review* 24(2): 191–205. B&M 7
8. Griffith T.L. (1999) Technology features as triggers for sensemaking. *Academy of Management Review* 24(3): 472–488. B&M 8
9. Pentland B.T. (1999) Building process theory with narrative: from description to explanation. *Academy of Management Review* 24(4): 711–724. B&M 9
10. Swanson D.L. (1999) Toward an integrative theory of business and society: a research strategy for corporate social performance. *Academy of Management Review* 24(3): 506–521. B&M 10

COMPUTING SCIENCE

1. Blume M. (1999) Dependency analysis for standard ML. *ACM Transactions on Programming Languages and Systems* 21(4): 790–812. COMP 1
2. Boyland J.T. (1996) Conditional attribute grammars. *ACM Transactions on Programming Languages and Systems* 18(1): 73–108. COMP 2
3. Paulson L.C. (2001) Mechanizing a theory of program composition for UNITY. *ACM Transactions on Programming Languages and Systems* 23(5): 626–656. COMP 3
4. Qian Z. (2000) Standard fixpoint iteration for Java bytecode verification. *ACM Transactions on Programming Languages and Systems* 22(4): 638–672. COMP 4
5. Reps T. (1998) ''Maximal-munch'' tokenization in linear time. *ACM Transactions on Programming Languages and Systems* 20(2): 259–273. COMP 5
6. Kimbrel T. (2001) Online paging and file caching with expiration times. *Theoretical Computer Science* 268: 119–131. COMP 6
7. Kolano P.Z. (2002) Proof assistance for real-time systems using an interactive theorem prover. *Theoretical Computer Science* 282: 53–99. COMP 7
8. Smith B.M. (2001) Constructing an asymptotic phase transition in random binary constraint satisfaction problems. *Theoretical Computer Science* 265: 265–283. COMP 8
9. Turner P.R. (2002) Residue polynomial systems. *Theoretical Computer Science* 279: 29–49. COMP 9

10. Vovk V. (2001) Probability theory for the Brier game. *Theoretical Computer Science* 261: 57–79. COMP 10

ECONOMICS

1. Goolsbee (2000) In a world without borders: the impact of taxes on internet commerce. *The Quarterly Journal of Economics* 115: 561–576. ECON 1
2. Heckman J.J. (2000) Causal parameters and policy analysis in economics: a twentieth century retrospective. *The Quarterly Journal of Economics* 115(1): 45–97. ECON 2
3. Hoxby C.M. (2000) The effects of class size on student achievement: new evidence from population variation. *The Quarterly Journal of Economics* 115(4): 1239–1285. ECON 3
4. Hubbard T.N. (2000) The demand for monitoring technologies: the case of trucking. *The Quarterly Journal of Economics* 115: 533–560. ECON 4
5. Lazear EP (2000) Economic imperialism. *The Quarterly Journal of Economics* 115: 99-146. ECON 5
6. Cameron L.J. (2000) Limiting buyer discretion: effects on performance and price in long-term effects. *American Economic Review* 90: 265–281. ECON 6
7. Nechyba T.J. (2000) Mobility, targeting, and private-school vouchers. *American Economic Review* 90: 130–146. ECON 7
8. Robertson R. (2000) Wage shocks and North American labor-market integration. *American Economic Review* 90: 742–764. ECON 8
9. Schmitt-Grohé S. (2000) Endogenous business cycles and the synamics of output, hours, and consumption. *American Economic Review* 90: 1136–1159. ECON 9
10. Wildasin D.E. (2000) Labor-market integration, investment in risky human capital, and fiscal competition. *American Economic Review* 90: 73–95. ECON 10

PHYSICS

1. Cairns I.H. (1999) Measurement of the plasma density using the intensification of z-mode waves at the elctron plasma frequency. *Physical Review Letters* 82(3): 564–567. PHYS 1
2. Chamberlin R.V. (1999) Mesoscopic mean-field theory for supercooled liquids and the glass transition. *Physical Review Letters* 82(12): 2520–2523. PHYS 2
3. Hewett J.L. (1999) Indirect collider signals for extra dimensions. *Physical Review Letters* 82(24): 4765–4768. PHYS 3
4. Hutchinson D.A.W. (1999) Self-consistent effects of continuous wave output coupling of atoms from a Bose-Einstein condensate. *Physical Review Letters* 82(1): 6–9. PHYS 4
5. Stevens M.J. (1999) Bundle binding in polyelectrolyte solutions. *Physical Review Letters* 82(1): 101–104. PHYS 5
6. Baraff G.A. (1998) Model for the effect of finite phase-coherence length on resonant transmission and capture by quantum wells. *Physical Review B* 58(20): 13799–13810. PHYS 6

7. Riseborough P.S. (1998) Theory of temperature-dependent angle-resolved-photoemission spectrum of heavy-fermion semiconductors. *Physical Review B* 58(23): 15534–15547.	PHYS 7
8. Ross M. (1998) Linear-mixing m odel for shock-compressed liquid deuterium. *Physical Review B* 58(2): 669–677.	PHYS 8
9. Shaw M.J. (1998) Localization at interfaces of imperfect A1Sb/InAs heterostructures. *Physical Review B* 58(12): 7834–7843.	PHYS 9
10. Wallace D.C. (1998) Electronic and phonon properties of six crystalline phases of Pu metal. *Physical Review B* 58(23): 15433–15439.	PHYS 10

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Nigel Harwood is a lecturer in applied linguistics and ELT at the University of Essex. His doctoral thesis is a corpus-based study of how the personal pronouns *I* and *we* are used in academic writing across four disciplines (Business, Economics, Computing, and Physics) by 'experts' writing journal articles and postgraduate students writing dissertations. He has published papers on citation analysis, on taking a corpus-based critical pragmatic approach to English for Academic Purposes (EAP), and on the role of the EAP textbook. His main research interests are in the areas of academic writing, EAP, materials design, and corpus-driven pedagogy.