

In Search of the Linguistics Niche: A Study of Research Article Introductions in Linguistics, Literature and Science

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Abstract

This paper investigates opening techniques used in published research articles in science, literature and linguistics. Since science and literature are popularly taken to represent opposite ends of the stylistic spectrum, one aim of the paper was to establish how far this was true. In particular, however, the stylistic nature of linguistics openings was investigated in relation to those in science and literature, in an attempt to establish which practice (scientific or literary) they adhered to. A survey of opening techniques yielded a number of rhetorical devices which formed the basis of analysis. Frequency counts made of these techniques indicated that all three types of papers were similar in preferring to make a positive, implicit announcement of the subject, although the precise method of doing this could differ. On the other hand, linguistics openings differed from literature openings in the frequency with which the subject was limited explicitly, the use of devices to capture the reader's attention, and in the use of the impersonal point of view. However, the analysis yielded only one significant difference between linguistics openings and science openings, i.e. in how often they indicated the plan of the paper. In comparing science and literature openings, it was found that they did not differ significantly in the frequency with which they indicated the plan of the paper or in the use of the impersonal point of view. The latter device is explored in some depth across the three disciplines to ascertain the extent to which joint authorship influenced the point of view used. Scientists made use of the merging of the plural we and the editorial "we" offered by joint authorship, but preferred the impersonal point of view in single-author papers. Literature papers (all single-authored) showed the most frequent use of the impersonal point of view, but linguists showed a tendency to use the personal point of view regardless of whether there was one or more than one author. The findings are discussed and suggestions made as to future research.

INTRODUCTION

For many academics who otherwise enjoy the research process, writing the required paper may not be quite so exciting. The intellectual curiosity which drove them to research their particular point in the first place has, after all, been satisfied and they are now faced with the rigorous task of writing the whole thing up in such a way that it will meet with the approval of their academic peers and lead to publication. It is true that some academics testify to an enjoyment of the discovery process inherent in such writing (c.f. Lowenthal, 1980; Lowenthal and Wason, 1981; Murray, 1986), in which their thoughts on the topic become clarified through having to write the paper, but most acknowledge the toil involved and the multiple re-drafting that may have to be undergone before a satisfactory version is achieved. Nor is this time-consuming (and, at times, painful) "spew and revise" process solely a feature of the more literary, humanistic branches of research writing. Rymer (1988), for example, records that the pre-submission revising and editing of a collaborative paper subsequently published in the journal of Biological Chemistry extended over a period of six months. Even this followed an "incubation period" of six months by the chief scientist after the research had been carried out, and after an initial drafting and revising of the paper which took three weeks. Within what is thus so obviously a difficult task, perhaps the most difficult sub-task may be that of writing the introduction and, insofar as the process of research on academic writing is attracting ever more introspective interest on the part of academic researchers, text introduction has provided considerable scope for investigation (see Swales 1990, p. 138). The present study falls within this context and investigates opening techniques found in published research papers in three different areas: science, literature and linguistics.

The choice of these areas is not random, and requires some explanation. Grabe (1987), in a statistical analysis of text types, has empirically established on a clear objective basis what earlier commentators (e.g. Crystal and Davy 1969, p. 252) had observed, namely that not only is there a clearly-defined type of writing called expository prose but also that, within this general text type, humanities texts are strongly differentiated from natural science texts. Linguistics as a field of study seems something of a hybrid. Linguists themselves like to

feel that their area is a science (although sociolinguists may, for obvious reasons, be grouped within the social sciences). On the other hand, linguists do not generally find themselves housed in the faculty of science and rarely in social sciences. Rather, linguistics is typically grouped within the humanities. This is underlined by the fact that it is still common for them to end up in employment in university departments of English or foreign languages, working side by side with literature specialists. Furthermore, some eminent writers seem quite confused about what constitutes linguistics and what constitutes literature. For example, the then literary editor of *The Times* newspaper, Philip Howard, wrote in 1984:

"It is a melancholy paradox that linguistics, the science concerned with the study of language should since the war have developed a jargon that is almost impenetrable to outsiders. Try this passage for density: "The text of a novel is a system of signs or representamina. The signs stand for something their objects, in Proust's case certain experiences ascribed to Marcel and others in Combray and other places". (p.46)

He then reveals that this example of the impenetrability of linguistic jargon was, in fact, written by Denis Donoghue, whom he cites as "Professor of Modern English and American Literature at University College, Dublin, occupant of the Henry James Chair of Letters at New York University, and one of the most luminous of modern academic linguisticians". Clearly, Professor Donoghue's main professional activity lies in the analysis and criticism of literary texts and to refer to him as a "Linguistician" (a term, in any case, described by the *Shorter Oxford Dictionary* as rare) may be to put the wrong emphasis on his work. A similar blurring of the demarcation between literature and linguistics is also implied by Dudek (1989). Complaining about the obscurity of academic language, he wrote, "The most pernicious form of pedantic language use is to be found, oddly enough, in linguistics and literary study, in the kind of literary criticism derived from France which is called post-structuralism, or deconstruction" (p. 457). Clearly, there is an area in which it may be impossible to separate a linguistic analysis of literary texts from literary criticism, but this statement serves to underline my earlier implied point namely that linguistics - like other "soft" sciences - is not easily classifiable as falling on the scientific or humanistic side of the

fence. This statement may be something of an epistemological chestnut and it is not the purpose of this paper to enter into a discussion of it, fascinating though it may be. Instead, having merely made the point, we will address two very simple questions arising from it:

1) Do research papers published in scientific journals differ from those published in literary journals in the techniques the writers use to begin their articles?

2) Assuming they do, do linguists writing their research papers follow the scientific practice or the literary practice?

Both questions could, of course, be re-cast as hypotheses: (1) that scientific papers would exhibit different opening techniques from those used in literary papers - and the justification for making such a hypothesis would rest on the work of Grabe (op. cit.); (2) that opening techniques used by linguists would approximate more those used by scientists than those used by literature scholars. The latter hypothesis rests on the consensus of academic linguists who define their subject matter as a science. Elucidation on these matters would not only add to our knowledge of text types but might also provide some practical guidelines for a linguist attempting to write a paper for publication. That there is a need for such help may be illustrated by referring to one of the better student guides to research writing: Lester (1993). This presents a comparison of the respective styles set by the Modern Language Association (MLA), used in the humanities, and the American Psychological Association (APA) used in the social sciences.¹ Topics centre on in-text citation procedures and how to set out a list of references. It is also pointed out that verb tense is used differently in the two styles when referring to a cited text, with the MLA requiring the present tense and the APA the past tense or the present perfect. But that is the limit of stylistic comparison. As far as introductions are concerned, the chapter gives general, across-the-board advice without drawing any distinction between what is customary or appropriate in the two respective areas. The present study, therefore, aims at investigating any such distinctions as found not only between linguistics and literature papers, but also between these and scientific papers.

ANALYTICAL MODELS

It has to be recognised that the aims of science and literary criticism are fundamentally different and this is mirrored by very fundamental differences in the general nature of scientific and literary papers, a fact illuminated by the work of Fahnestock and Secor (1982 and 1988). Turning to the classical concept of stasis (a system of rhetorical invention leading to a taxonomy of the types of argument) they pointed out that, whereas the rhetoric of science articles rests on the stases of fact, classification and cause, and repeatedly works at establishing the value of what is being done, articles in literature rest on the stasis of a value that their readers already accord to the work being studied and may be seen as "celebrating and reinforcing the values shared by their readers" (Fahnestock and Secor, 1982). In effect, this largely echoes the conclusions of Bazerman (1981 and 1988) in his analysis of three research articles in the fields of chemistry, sociology and literary criticism. However, he felt that, since the audience of the science paper he studied would be expected to share a highly developed background covering previous work in the field, methodology and criterion for judging the claims made, this means that the authors "do not urge, but rather leave the audience to judge and act according to the dictates of science" (Bazerman, 1988, p46). But the paper he analysed was Watson and Crick's article on the structure of DNA which is perhaps atypical in the sense that the authors knew they had made one of the landmark discoveries of modern science - nothing less than the structure of the substance of nature - a distinction not shared by the mass of papers published in science. This may account for his perception that the scientists concerned did not feel the need to "urge" or, to borrow Fahnestock and Secor's phraseology, "to work repeatedly at establishing the value of what they had done". Nevertheless, they were still constrained by the "dictates of science" to establish their claims within the framework of arguments and knowledge already available to the scientific community. Bazerman also found this to be true in the case of the sociology paper although he attributes the greater persuasiveness (or urging of the validity of the claims) shown in this paper to a lack in the sociological readership of a "uniform framework of thought or criteria of proof" rather than to the uniquely-distinguished nature of the claims made

in the science paper he was comparing it with. As regards the literature paper, he points out that there is an absence of a specific claim embedded within an already established knowledge matrix. Rather, according to Bazerman, the author strives to enable the reader to feel what Wordsworth felt and thereby enhance his appreciation of Wordsworth's poetry. In this there is no provable clear-cut right or wrong which must be established but rather a presentation of plausibility which depends on the imaginative insights of the critic. This seems very much in line with the celebratory and value-reinforcing nature of literary papers alluded to by Fahnestock and Secor.

Pragmatically, such interdisciplinary contrasts have resulted in very broad, fundamental differences in the texts of research articles. Swales (1990), for instance, has pointed out that the "harder" the science, the more the paper conforms to a strictly-delineated macrostructure (i.e. Introduction - Method - Results - Discussion). The "softer" social and behavioural sciences show mixed practice in applying these science-text conventions (Bazerman, 1988), while papers in the humanities do not seem to apply them at all. Our focus is on what goes on in one of the sections of the macrostructure (i.e. the Introduction) and here it would not be possible to overlook the seminal work of Swales (1990) on genre analysis. From his analysis of papers in the pure, applied and social sciences, Swales has come up with what he calls a CARS (Create a Research Space) model of research article introductions which would seem to offer the ideal tool in the present analysis. Quite how far it is applicable to non-scientific papers is not clear, particularly in view of the interdisciplinary differences we have already raised. Swales himself reports that 25% of a small sample of papers from "Research in the Teaching of English" did not fit the pattern and he further alludes (p. 166) to one article from this journal as being hard to categorise within his model because of its anecdotal, attention-getting opening. Because of the intrinsic differences that exist between scientific and literary research articles it does not seem fruitful, therefore, to try to measure the one against the other by using a measuring device calibrated to suit only one. It is true that differences - or gaps - would be revealed, but these rest on the already-known inherent differences between the two disciplines and would not yield any new insights. Furthermore, while it would show what

literature papers *do not* have in comparison with science papers, it would not reveal features that literature papers *do* have that might be absent in science papers. Our main focus is on linguistics papers and on catching the similarities and differences between them and papers from the other two disciplines. It was felt, therefore, that a broader, less discipline-specific approach would be more appropriate and, to this end, a return was made to the more general, traditional functions of opening. To indicate what these are, the next paragraph presents a resumé distilled from a number of writing guides (e.g. Brooks and Warren, 1970; Kane and Peters, 1966; Lannon, 1992; Rackham and Bertagnolli, 1991).

Traditionally, an introduction may fulfil any or all of the functions of announcing the subject, limiting the subject, indicating the plan of what follows, and attracting the reader's interest. Announcing the subject may be done explicitly, where the writer states categorically what he will discuss, or implicitly where - by using devices like a rhetorical question or a dictionary definition - he implies what his subject will be. Announcements may be made in the very first sentence, or may be delayed through the process of focusing down, where the writer starts with a broad approach and subsequently narrows down to his specific topic. Alternatively, delayed announcements may be effected through focusing up where a specific incident is related and the writer generalises from that to his area of discussion. Limiting the subject may be done implicitly or explicitly, but with the added dimension of being either positive or negative. Thus, the writer may indicate what he will discuss or what he will not discuss. Another facet of subject limitation is the establishment of point of view, whereby the writer may choose to write impersonally by avoiding explicit reference to himself, or personally, where he uses the first person throughout, thereby clearly indicating the subjective nature of his statements. Writers do not always feel that it is necessary to reveal the plan of their piece, so that a statement of how the work will be organised - again whether stated explicitly or more subtly hinted at - is optional. The same may be said for any attempt to attract the interest of the reader. Where such a function is to be served, the writer may use one of a number of devices such as an anecdote which will lead into the subject, an allusion, a rhetorical question, a paradoxical statement, a non sequitur, a metaphor, a definition or, indeed,

any kind of arresting word or construction. In this there is considerable scope for the writer's ingenuity in thinking up ways to entice the reader into reading further, either by appealing to his capacity to be amused, shocked or intrigued, or by appealing to him on a more intellectual level by indicating that here is something which he, as a thinking and/or caring person, cannot afford to ignore.

As can be seen, the above descriptions relate to general features which do not rest on discipline-specific assumptions about what research writers do in their introductions, but seem wide enough to provide a workable basis for the present analysis. Consequently, the following features were selected for investigation:

1) Was the subject announced explicitly? (e.g. "In this paper we describe the asymmetries and explore the observational consequences of an eastward tilt". [Science paper U3 from corpus, see Appendix]

- or was the subject announced implicitly? (e.g. "The New Historicism sounds like such a good idea that it's hard to see in the abstract why it is proving so tendentious". [Literature paper J1 from corpus]).

2) Was the announcement immediate (i.e. made in the first paragraph) or delayed (made in a subsequent paragraph)?

3) Was the subject limited explicitly? (e.g. Literature paper M1 from corpus begins with a broad allusion to discussions by medieval scholars of a late medieval French institution called the "Fraternity of the Penitents of Love". The writer then narrows down the focus to a particular passage to which all these historians refer as their source, lists questions for which he feels no one has supplied suitable answers and then ends his paragraph with: "These are some of the questions which I hope to answer").

- or was the subject limited implicitly? (e.g. The introduction to Literature paper N1 begins with a broad discussion of the relationship between parody and ambiguity, moves to a discussion of a particular interpretation of parody and ends with: "The parodies of Hemingway [the focus of the paper] offer a spectrum of many such detailed perspectives of his art.")

4) Was the subject limitation done negatively (e.g. Linguistics paper D3 "It is not my intention to do a critical review of Second Language Acquisition literature that tacitly or explicitly adopts an information-processing perspective, pointing out where vagueness lies... Rather, I will attempt to illustrate my own perspective by examining...)

- or was the subject limited positively? (e.g. Linguistics paper C5 "The present paper is concerned with the second major type of lexical ambiguity - namely, polysemy.")

5) Was the point of view personal (i.e. did the writer use the first person throughout his paper, whether singular or plural) or impersonal (i.e. did the writer avoid the use of the first person altogether, perhaps by adhering to passive constructions?) A fairly stringent criterion of the personal style is adopted here with any instance of first person pronouns marking the paper as being in the personal style. While it is possible for any writer to mix the personal and impersonal within one paper (e.g. to use different constructions in different parts of the paper), this very rigid criterion was applied here since our aim was to pick up any across-the-board differences among the three types of papers. The definition of personal/impersonal in this context is not as simple as it may initially appear, and this point will be taken up again later in the paper.

6) Did the writer indicate the plan of his paper? (e.g. Linguistics paper F4: "Section 1 makes a brief diachronic survey of the semantic properties of CAN and MAY. Section 2 examines recent contributions to research in this area. Finally, section 3 elaborates a new approach to these problems and shows...").

7) Did the writer use any overt device to interest his reader? Since interest is subjective and, particularly in the context of the research article, derived largely from the professional content of the paper, the analysis here is confined to noting any use by the author of any of the techniques listed in the preceding paragraph.

It is obvious that there is some overlap between the CARS model of Swales and the features listed above. Table 1 sets out the two approaches side-by-side to give an idea of the approximate relative

Table 1

Approximate correspondences between Swales' CARS model (1990) and traditional features of opening (based on Kane and Peters, 1966)

CARS Model	Traditional Features of Opening
Move 1: Establishing a territory Step 1 Claiming centrality and/or	Overt attempt at attention-getting or arousing reader's interest
Step 2 Making topic generalisations and/or	Immediate implicit and explicit announcement of subject (Possibly also immediate implicit and explicit limitation of subject)
Step 3 Reviewing items of previous research	
Move 2 : Establishing a niche Step 1A Counter-claiming or Step 1B Indicating a gap Step 1C Question raising or Step 1D Continuing a tradition	
Move 3: Occupying the niche Step 1A Outlining purposes or Step 1B Announcing present research	Delayed implicit or explicit announcement of subject Delayed implicit or explicit limitation of subject
Step 2 Announcing principal findings	
Step 3 Indicating research article structure	Indicating the plan

correspondences existing between them.

As can be seen, much of the overlap arises out of whether announcement or limitation of subject is immediate or delayed, thereby leading to a rough equation with Move 1 or Move 3. It is therefore interesting to note that Swales reports in one of his studies (Swales and Najjar, 1987) that 9% of the introductions began with a Move 3, while in another much smaller study (Swales, 1990), he found 25% beginning with a Move 3. Finally, to illustrate how the traditional analysis picks up on features missed by the CARS model, it is worth looking at the very brief first paragraph in the Watson and Crik paper on DNA referred to by Bazerman (op. cit.):

We wish to suggest a structure for the salt of deoxyribose nucleic acid (DNA). This structure has novel features which are of considerable biological interest.

Here, the authors begin with a Move 3, Step 2. Applying the traditional analysis, we would say that there is an immediate explicit announcement of the subject, the writers use a personal point of view, and there is - through the use of words like "novel" and "of considerable biological interest" - an overt attempt to arouse the interest of the reader.

CORPUS AND METHOD

The corpus for analysis comprised the introductions from 78 papers from 19 journals representing the fields of science, literature and linguistics. Obviously, in terms of the thousands of journals now published in these three areas, this is a very small sample, but efforts were made to ensure that it provided a good cross-section of work in the three fields by including important, prestigious journals covering the major branches contained in the three areas. The journals were selected from the periodicals shelves of the libraries of Kuwait University and were published in 1989-90. Because of budgetary limitations, the libraries subscribe to a relatively limited number of journals selected by the teaching staff of the various departments. Lists of holdings are subjected to periodic review to ensure professional relevance. This, in turn, provided an additional check on the professional prestige of the journals selected for the present analysis. The only other criterion for selection was that all the journals were published in either Britain or the United

States. The first few papers (3-6) of one issue were taken from each journal for analysis so that the corpus comprised the introductions of 26 papers from 6 scientific journals, 26 papers from 6 literary journals and 26 papers from 6 linguistics journals. A complete list of all the papers investigated is presented in the Appendix, along with the code numbers used to refer to individual papers. Each introduction was then subjected to a frequency count of the various rhetorical devices indicated in the foregoing section.

RESULTS AND DISCUSSION

Table 2 presents the results of the frequency count of opening techniques as applied to the papers described above. It shows that in the case of some techniques, there is uniformity of approach across the three disciplines in question, while in the case of others there are marked differences across the three types of papers. The following discussion is based on this division.

Table 2
Frequencies of Opening Techniques

	Literature		Linguistics		Science	
	Frequency	%	Frequency	%	Frequency	%
Announcing the subject						
Explicitly	2	7.7	2	7.7	4	15.4
Implicitly	24	92.3	24	92.3	22	84.6
Immediate	25	96	24	92.2	26	100
Delayed	1	3.8	2	7.7	0	0
Limiting the subject						
Explicitly	8	30.7	25	96.2	21	80.8
Implicitly	18	69.2	1	3.8	5	19.2
Positively	26	100	23	88.5	26	100
Negatively	0	0	3	11.5	0	0
Point of view						
Personal	9	34.6	18	69.2	14	53.8
Impersonal	17	65.4	8	30.8	12	46.2
Indicating the plan	10	38.5	16	61.5	6	23
Interesting the reader	15	57.7	2	7.7	1	3.8

a) Similarities in preferred technique.

As can be seen, certain similarities exist across the three types of papers, particularly with respect to the announcement of the subject. Apart from a very slight tendency on the part of scientists to make an explicit announcement of the subject, most writers, irrespective of the field, announce their subject implicitly and do so immediately in the first sentence. However, much rests on the interpretation put on the concept of "announcing the subject". What it has been taken to refer to here is the technique of the writer in letting the reader know the broad subject area he can expect the paper to deal with. The precise method used to do this may, however, vary across disciplines. For example, in the linguistics papers studied, the writer usually starts with a description of some language phenomenon which could be derived from previous research in the area, but which could equally well be based on common knowledge at the level of the educated layman. Examples of this are:

"Although humans worldwide have approximately the same vocal apparatus, the sounds in various languages are not the same." (Paper E3)

"Many words have a unique physical representation but more than one meaning." (Paper CS)

"In standard Italian there are two singular forms of the masculine definite article: il and lo." (Paper F2)

In literature papers, similar initial generalisations may be discerned, but with the additional factor that this early subject announcement may refer only to a particular author, with the specific work(s) forming the focus of the paper being introduced much later (or, conversely, mention of a specific work precedes the introduction of the author or set of works to be discussed). Here are some examples of this:

"Shakespeare's plays often include characters ready to save us the bother of seeing for ourselves."(J2)

"For those interested in the history of reading, there has been no scholar more inspiring than Robert Danton." (K1)

"If the twentieth century's concern with language and textuality

could be summed up in one playwright, Eugene Ionesco would stand a very good chance of taking the distinction." (L5)

Scientific papers, on the other hand, commonly draw their initial statements from previously published research, and are followed by a citation, e.g. "The composition of elastic sediments is primarily controlled by tectonic setting (Crook, 1974) (Paper Q 4). Another common opening device used by scientists is the simple statement that a certain research area has been the focus of considerable recent research ("The physical and chemical properties of electronically conducting organic polymers have received a great amount of attention over about the last one and one half decades." T1). Papers in this group may, however, open with a '**general knowledge**' type of statement about the broad subject area, but it is unlikely that an educated but non-scientifically oriented layman would normally have access to the information contained therein. An example of this is the opening of Paper R5: "The sugar interaction with alkaline earth metal ions is very important in dictating the biological properties of carbohydrates." The absence of any cited source to support this statement marks it as one which would be common knowledge to those working in the field, but it would not be so for the non-specialist who may yet have an adequate vocabulary, to understand the sentence.

Another trend common to all three disciplines arises out of the fact that almost all the writers studied indicated what they were going to write about (i. e. they limited their subjects positively). Only three (B5, C2 and D3) did the opposite and indicated what they were not going to write about. It may be worth noting that all three were linguists and that each was published in a different journal. Without a larger sample, it would be impossible at this stage to say whether or not this indicates anything other than random individual preferences.

b) Differences in preferred technique

Returning to Table 2, it is possible to isolate four techniques which, on inspection, indicate clear differential application in the three groups of papers: explicit vs. implicit limitation of the subject; personal vs. impersonal point of view; indication of the plan of the paper; attempt at interesting the reader. The first two of these comprise mutually exclusive pairs, i. e. if a writer limits his subject implicitly, he cannot

also limit it explicitly and, similarly, he cannot use both the personal and the impersonal point of view. For the purpose of analysis, therefore, only one member of each of these pairs needs to be considered. For each technique, individual Chi-square tests were conducted of respective pairs of research areas to test the null hypothesis that there was no difference between the members of each pair of research areas in the frequency of their use of the technique in question. A significant value for Chi-square allows rejection of the null hypothesis and adoption of the alternative hypothesis that two research areas in the pair differ significantly in how often they use the particular technique. Results of this analysis are presented in Table 3. As can be seen, each technique shows a different picture as far as which pairs of research areas allow rejection of the null hypothesis. A detailed interpretation of this data follows.

Table 3

Chi-square analysis of pairs of research areas and particular techniques

Technique	Research area	Chisquare	df	Significance level
Explicit limitation of subject				
	Science/Ling.	0.17	1	p>.2 n.s.
	Lit./ Ling.	8.76	1	p<.005
	Science/ Lit.	5.8	1	p<.02
Impersonal point of view				
	Science/ Ling.	0.8	1	p<.5 n.s.
	Lit./ Ling.	4.84	1	p<.05
	Science/ Lit.	0.86	1	p<.5 n.s.
Indicate plan				
	Science/ Ling.	4.55	1	p<.05
	Lit./ Ling.	1.38	1	p<.005
	Science/ Lit.	1.00	1	p<.001
Interest the reader				
	Science/ Ling.	0.33	1	p<.7 n.s.
	Lit./ Ling.	9.95	1	p<.005
	Science/ Lit.	12.25	1	p<.001

Explicit Limitation of Subject

The null hypothesis could not be rejected in the case of Science compared to Linguistics, indicating that these two areas do not differ significantly in their frequency of application of this technique. However, the data allowed rejection of the null hypothesis between Literature and Linguistics and between Science and Literature, the former at a very high level of statistical significance, in terms of how often this technique is used. Linguistic papers may therefore be said to be stylistically similar to scientific papers, while literary papers differ from them in being less explicit in their limitation of the subject.

Impersonal Point of View

In this case, the data allowed rejection of the null hypothesis in only one comparison, Literature vs. Linguistics, indicating a very clear-cut difference between these areas in their use of this feature. No significant difference was found between scientific and linguistic papers or between scientific and literary papers in this respect. This provides statistical support for what may be visually observed in Table 2, namely that scientific papers are mid-way between linguistic and literary papers in the extent to which they are written impersonally. This result is interesting since, looking at the over-all figures on point of view, we come up with the perhaps surprising departure from the supposed impersonality of professional academic writing in general. Out of the 78 papers studied, just over half (41, or 52.6%) were actually written using the personal point of view. Interestingly, it is the literature scholars, and not the scientists, who are the least personal, with 17 out of the 26 literature papers (or 65.4%) being written from the impersonal point of view. This marks them off quite significantly from the linguistics papers, which show the opposite trend, with 18 (or 69%) being written using the personal point of view. Scientists seem to be almost split down the middle on this issue since 14 out of their 26 papers (or 53.85%) were written personally and the rest impersonally. What emerges, then, is the fact that neither linguists nor scientists - the two groups which could be expected to show impersonality in their writing - appear to feel constrained to adopt an impersonal point of view. Linguists, on the contrary, show a very clear-cut preference for writing personally. One way of trying to account

for the way the figures have come out is to consider the effects of single and joint authorship on the point of view adopted. Where there is a single author, the use of the first person singular may indeed inject a very personal, and some may say even egotistical, note. This may be avoided to a certain extent by the use of an editorial "we" (Quirk, et al., 1985). However, where there is joint authorship of a paper, the personal "we" becomes indistinguishable from the editorial "we" and may, therefore, present a ready-made solution to the problem of avoiding being personal without being excessively formal. Table 4 provides a breakdown of the data to help investigate this line of thinking.

Table 4

Personal and Impersonal Point of View

	Literature		Linguistics		Science	
	Frequency	%	Frequency	%	Frequency	%
All Papers						
Personal	9	34.6	18	69	14	53.9
Impersonal	17	65.4	8	31	12	46.1
Joint Papers	0	0	10	100	16	100
Personal	0	0	6	60	10	62.5
Impersonal	0	0	4	40	6	37.5
Single-Author Papers	26	100	16	100	10	100
Personal (a) Singular	6	23.1	9	56.3	2	20
(b) Plural	3	11.5	3	18.7	2	20
Impersonal	17	65.4	4	25	6	60

Perhaps the first point to note is the total absence of joint papers in the literature sample. On the other hand, 16 out of the 26 scientific papers (or 61.5%) were written jointly, while 10 out of the 26 linguistics papers (or 38.5%) were joint, a trend which may indicate something of a link between linguistic and scientific practice in this aspect of scholarship. However, our question is: do writers of joint papers capitalise on the merging of the editorial and personal "we" and show a greater tendency to use the personal point of view than the impersonal point of view? As can be seen, the answer is "yes" for both linguistics and sciences, with

60% and 62.5% of joint papers in the two disciplines respectively being written in the first person plural. A larger sample of joint papers in each area would be required to establish whether this trend is statistically significant. Nevertheless, the figures do seem to present strong grounds for believing that many scientists and linguists producing joint papers take the opportunity presented and avoid writing impersonally. However, the situation becomes even more interesting when single-author papers are considered. Our first question is: do single authors tend to write impersonally or personally? As can be seen, the answer is not consistent across all three disciplines. 17 out of the 26 single-author literature papers (or 65.4%) were written impersonally, and 6 out of the 10 scientific single-author papers (or 60%) were also written impersonally. However, it is the linguists who are very distinctive in this regard since only 4 out of their 16 single-author papers (or 25%) were written impersonally. This marks them off as being quite different from the other two groups since the single-author literature papers show a very clear preference for impersonality while single-author science papers show a very slight preference for impersonality (although it must be remembered that, in the case of the science sample, the number of single-author papers was very small). Turning to the single-author papers written using the personal point of view, we can now ask: did they try to avoid the completely personal viewpoint by adopting the editorial "we"? In this case, the answer is 'no'. Only 3 out of the 12 relevant linguistics papers opt for the plural 'we' (i.e. 18.7% of all single-author linguistics papers), 3 out of the corresponding literature papers (i.e. 11.5% of single-author literature papers), and only 2 out of the 4 corresponding science papers (i.e. 20% of single-author science papers). Thus, if the use of the editorial "we" is regarded as an acceptable escape route (to avoid sounding too personal in a single-author paper), it does not seem to have been a highly popular device in the papers in any of the three disciplines in our sample.

What emerges from all this seems to be a very distinct leaning towards the use of the personal point of view in linguistics papers whether they are written by one or more than one person. The tendency towards the personal point of view shown by scientists seems to be a feature much more of joint authorship. When a scientist writes a paper independently, he seems more likely to be bound by the convention of

impersonality. If adherence to the received practice (on the avoidance of the personal in academic writing) can be viewed in terms of conservatism, then literature scholars are the most conservative, and linguists the least. Scientists show signs of relinquishing their conservatism but largely where this may be "disguised" through the opportunity offered by joint authorship. This breaking away from the rigid constraints of impersonality in their writing may indicate a developing feature of style which it might be worth examining again in, say, 10 years' time. As it stands at the moment, the use of the first person may no longer be the stylistic taboo it was once thought to be in formal scientifically-oriented writing, a trend which may indicate an attempt by writers in the area to be less distant to their readers. Literature papers, although still dealing with highly specialised subject matter, are written in language which is, by and large, more accessible to an educated but non-specialist readership. As such, they may not require the use of such surface devices as the first person pronoun (whether singular or plural) to make their content at least appear more "reader-friendly". This may explain why they adhere to the more traditionally-expected impersonality in their writing. However, a discussion by Gragson and Selzer (1990) on the use of 'I' and 'we' in the two scientific papers they analysed may provide an alternative interpretation. Although they overlook the fact that the paper using 'I' was a single-author paper while the one using "we" was a joint paper, they do make the interesting observation that the single author used an impersonal point of view in the factual sections of his paper but shifted to the first person singular in outlining what he intended to do in the paper and in summarising his conclusions. They also build an argument that the scientist in question used the first person singular as a signal to the reader of his authority and control. Although it may be unwise to draw too much from one case, the idea of differences in the perceived relationship between author and reader may offer an intriguing explanation of the inter-disciplinary differences found here. It is certainly a suggestion that future studies might investigate.

Indication of Plan

Reference to Table 2 reveals that, of the three groups, linguistics papers were the most likely to employ this technique (found in 61.5% of linguistics papers), and scientific papers the least likely (23% of science

papers). Table 3 shows the data to allow rejection of the null hypothesis between science and linguistics, indicating a clear statistical difference between these two types of papers in the use of this technique. The data did not allow rejection of the null hypothesis between literature and linguistics papers, and between science and literature papers. From the data available, it would appear that literature scholars seem to fall mid-way between scientists and linguists in their tendency to indicate the plan of their paper.

What is striking here is the infrequency with which scientists apply this technique since, at first glance, it seems to run counter to the common perception of the orderly, systematic approach of the scientist. However, when it comes to writing their papers, scientists may feel that indicating the plan is somewhat redundant since scientific papers follow a traditional pattern. Thus, once the research point has been identified, the paper will automatically be divided into sections headed: Method, Results, Discussion etc., so that the need for an explicitly-delineated plan is eliminated. Linguistics papers, on the other hand, do not all follow this pattern unless they are actually reporting on experimentation. The preponderance of explicit plans in linguistics papers may, therefore, indicate the efforts of the linguists to maintain an orderly, scientific style in compensation for the fact that their papers are not predictably patterned to the extent that scientific papers are. This seems to have been the case also for the 15 papers in the field of computer technology analysed by Cooper (1985). She found that 10 out of the 15 introductions (=66.7%) detailed the subsequent structure of the research paper, a figure just slightly higher than the 61.5% of linguistics papers obtained here. Another point to note here is the fact that, in all the papers analysed, linguistics and science papers are preceded by an abstract, which provides further help to the reader in representing what the paper is about. Literature papers, on the other hand, are not preceded by an abstract and are not written in sections under universally applied headings. Perhaps this might lead to the expectation that they would be more likely to indicate the plan of the paper to the reader. However, this in turn may assume an explicit orderliness in the writing of the paper which may not always be a requirement in this kind of writing. Out of the 26 literature papers, 10 (or 38.5%) did indicate the plan of the

subsequent paper, but this still leaves more than half which did not.

A final point may, however, be worth noting. The high incidence of explicit plans in linguistics papers, coupled with the linguists' pronounced tendency (noted above) towards the use of the personal point of view, seems to be consistent with the observation of Gragson and Selzer (op. cit.) that their single-author scientist used the first person when forecasting his paper's contents (i.e. stating explicit plans). This apparent correlation is one that needs to be explored in more detail.

Interesting the Reader

Table 2 shows this to be predominantly a feature of literature papers (found in 57.7% of these papers). Scientific and linguistic papers, on the other hand, show an almost negligible application of this technique (found in only 3.8% and 7.7% of these papers respectively). The one scientific paper classified as overtly trying to capture the reader's interest (Paper P1) gains this distinction through the use of the adjectives fascinating and enigmatic (applied to an enzyme), which were considered likely to intrigue the reader and encourage him to read on. However, as with beauty and the eye of the beholder, interest and the mind of the specialist reader may share a relationship which is not obvious to the outsider. Leaving aside very obvious interest-arousers such as paradox ("Mark Twain's third book, 'Roughing It' was in a real sense his first.") [Paper N2], or a surprising or thought-provoking first sentence ("Lady Susan has been an embarrassment to lovers of Jane Austen.") [J3], much of the "success" of the literature papers in this respect stems from the use of a general statement at the beginning of the paper which conveys information which is not only of interest to the specialist but also comprehensible and of interest to the reasonably well-educated non-specialist reader. Compare, for example:

In trying to re-invent the American myth to fit female consciousness, the woman writer faces a double task: her work must respond to both the mainstream of native patriarchal literature and to the swelling current of writing - both British and American - by and about women. (N6)

with:-

Intramolecular interligand interactions in ternary complexes are analogous to the metal-enzyme-substrate interactions in metallic enzymes, resulting in the specific and selective nature of the metallic enzymes. (R1)

Obviously, the vocabulary of the latter puts it beyond the reach of any reader without a knowledge of biochemistry, although, to such a specialist, this may be an arresting and attention-grabbing opening. However, the examination and classification of rhetorical devices is not normally undertaken by biochemists. Perhaps an entirely new dimension of insight might be added if it were! On a more serious note, however, it must be said that scientists do work very hard to interest their readers. Myers (1985), for example, provides a fascinating case study of the construction of two research grant proposals which illustrates this very clearly, while Thompson (1993) shows that even in Results sections scientists do not simply report their data with "cold" objectivity but strive to persuade their readers of the validity and significance of their findings - "Experimental results in science gain acceptance from an expert audience by means of rhetorical presentation" (Thompson, *ibid*, p126). The problem remains that of the inaccessibility of that interest to the non-specialist. It is interesting, therefore, that Myers (*op. cit.*) reports that, at the outset of his study, he interpreted nearly all the scientists' revisions as "improving readability or accuracy" whereas, as he became more immersed in his project (and hence in the context of science), his interpretation of these revisions shifted to one involving the scientists' place in their scientific community. It may not be so facetious, after all, to ask scientists to assess the interest-level of their colleagues' writing.

CONCLUSION

In returning now to attempt to answer the questions posed at the outset of this study (i.e. whether or not papers published in scientific journals differ from those published in literary journals in the techniques used by writers to begin their articles and whether linguistics papers followed scientific practice of literary practice in the use of opening techniques), Table 5 may be helpful since it indicates differences and similarities between pairs of subject areas in their use of the rhetorical devices studied.

Table 5
Differences and similarities between pairs
of subject areas in their use of rhetorical devices

	Science vs Lit.	Science vs Ling.	Lit. vs Ling.
Areas of Significant Differences			
Explicit limitation of subject	*		*
Impersonal point of view			*
Indication of plan		*	
Interesting the Reader	*		*
Areas of No Significant Differences			
Explicit limitation of subject		*	
Impersonal point of view	*	*	
Indication of plan	*		*
Interesting the reader		*	

As can be seen, significant differences between science and literature papers were found in the use of only two techniques: explicit limitation of the subject (with scientists being more likely to adopt this technique than literature scholars), and interesting the reader (with literature scholars making more use of this than scientists). No significant difference was found in the two groups' use of the impersonal point of view or in their indication of the plan of their paper. As far as point of view is concerned, it has already been pointed out that scientists may be attempting to break away from the rather cold impersonality of the traditional scientific style, while literature scholars - because their subject matter is in any case more accessible to the general reader - may not feel so compelled to relax this stylistic stricture. Whatever the underlying reasons may be, the result is a convergence of science and literature papers regarding the degree of personal tone in their writing, which may be a trend worth re-examining after the lapse of some years. As regards the indication of the plan of the paper, it has also already been pointed out that the relative absence of this in scientific papers stems from the traditional conventions followed in reporting experimentation. The comparative

absence of explicit plans in literature papers may mark a feature of literature paper style. Thus, we may say that scientists tend not to indicate the plan of their papers because they do not need to (it is predictable), while literature scholars tend not to do so because they do not choose to. In any event, what is interesting is that, at least for the use of the devices focused on here, science papers and literature papers are not as widely polarised as might commonly have been expected.

Turning to whether linguistics papers follow the scientific practice or the literary practice, our data shows only one significant difference between science and linguistics, i.e. in indicating the plan of the paper. Unlike scientific papers, many linguistics papers do not report experimental findings but may involve, for example, linguistic analysis or description. Because of this, the format of the paper is not as predictable in linguistics as it is in science, so that an overt indication of the plan of the paper may be a feature that will always separate linguistics introductions from scientific introductions. On the other hand, the openings of linguistics papers differed significantly from those of literature papers in three respects: they were more likely to limit the subject explicitly, they were less likely to incorporate a device to interest the reader, and they were less likely to use the impersonal point of view. The direction of the difference in the latter technique is perhaps surprising since, on the basis of the drift towards the scientific style on the part of linguistics papers, one might expect linguistics papers to be more impersonal than literature papers. However, the difference comes about through the fact that neither linguistics papers nor scientific papers were written as impersonally as literature papers, a finding which has already been further investigated and discussed in the preceding section. Weighing up the evidence from our data, therefore, we must conclude that the openings of linguistics papers veer more in the direction of scientific practice than literary practice. However, the fit between the two was not an exact one. This being so, and since scientific practice has already been investigated in considerable detail by Swales and the other researchers mentioned throughout this paper, it would seem that a logical next step would be to subject linguistics and literature papers to a similar level of discipline-specific analysis. In other words, since something of their placement on the interdisciplinary spectrum has been shown, it would be timely now, to adopt a more 'rooted' ap-

proach by examining how introductions (and subsequent parts of the paper) in these particular disciplines relate to the aims and assumptions of the linguistic and literary communities. For the moment, however, we may tentatively say that our evidence from introductions provides grounds for believing that papers in these three disciplines represent sub-genres of the more general genre of the research paper. However, to say this is to imply that, within any one of these sub-genres, there is some kind of homogeneity making it possible to 'zoom in' on an average or typical type of science paper or linguistics paper or literature paper. One of the things that became increasingly clear to the researcher as the analysis proceeded was that this prototypical assumption could not be upheld. Even in science, not every paper presents experimental findings. Many describe species or complex physical phenomena, for example, so that drawing up a list of supposed typical characteristics may be too coarse an approach. Furthermore, even within the discourse conventions deemed to be associated with writing within a particular discipline, individuals practise considerable variation. This may simply be at the level of idiosyncratic choice, or may, as the studies of Myers (op. cit.) and Gragson and Selzer (op. cit.) have/shown, relate to the author's professional standing as perceived by his peers within that discipline - or even to the persona he wishes to project to these peers. Thus, a straightforward layered model may be too simplistic to cope with what is, essentially, a complex calculus of many interacting variables. Since the teasing out of disciplinary stylistic conventions from these socio-personal choices in the matter of rhetorical presentation may, at this stage of our knowledge, be an impracticable task, perhaps a less ambitious line of thinking may provide a more workable approach. It may, therefore, be worth underlining what has just been alluded to, namely that the term 'linguistics paper', for example, does not refer to a single type of paper. Such papers may report research carried out in different ways (e.g. through experimentation, observation or linguistic analysis). Similar variation may be found in the research procedures of other disciplines, and it cannot be ruled out that the interdisciplinary overlapping found in our results might have stemmed from this factor. To meet a more rigorous level of analytical stringency, this would have to be controlled for. Thus, an alternative direction for analysis to take would be to cut across disciplines and be based on the

research method (e.g. this paper is an example of linguistic description, which is a sub-genre of scientific [as opposed to creative] descriptive writing, which is a sub-genre of research writing). This approach has the attraction of targeting the cognitive commonalties and differences that unite and separate different disciplines across the interdisciplinary spectrum. For example, would one therefore find that a phonetics paper describing the sound system of an exotic language has more in common, in the way it is written, with an entomology paper describing the members of a genus of tropical centipedes, than with a phonetics paper reporting a sound discrimination experiment? Obviously, much yet remains to be established.

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APPENDIX

Papers Used in the Analysis

Linguistics Papers

A. International Review of Applied Linguistics 28 (1)

- 1) Adamson, A.D. Prototype Schemes, Variation Theory and the Structural Syllabus.
- 2) Wildner-Basset, M.E. The Clanger Phenomenon and the Foreign Language Learner.
- 3) Dubois, B.L. Thematization Across Machine and Human Translation: English to French.

B. Journal of Child Language 17 (1)

- 1) Locke, J.L. and Pearson, D.M. Linguistic Significance of Babbling: Evidence from a Tracheostomized Infant.
- 2) Hicksy, T. The Acquisition of Irish: A Study of Word-Order Development.
- 3) Bavin, E..L. Locative Terms and Warlpiri Acquisition.
- 4) Dennith, K. Subject, Topic and Sesotho Passive.
- 5) Ginsberg, E.H. Maternal Speech and the Child's Development of Syntax.
- 6) Pelligrino, M..L. and Scopesi, A. Structure and Function of Baby Talk in a Day-Care Centre.

C. Journal of Psycholinguistic Research 18 (6)

- 1) Langendoen, D.T., McDaniel, D. and Langsan, Y. Preposition-Phrase Attachment in Noun Phrases.

- 2) Cooper, W.E. A Psychological Perspective in Intonational Grouping.
- 3) Osterhout, L. and Swinney, D.A. On the Role of the Simplicity Heuristic in Language Processing: Evidence from Structural and Inferential Processing.
- 4) Boland, J.E., Tannenhaus, M.K., Carlson, G. and Garnsay, S.M. Lexical Projection and the Interaction of Syntax and Semantics in Parsing.
- 5) Durkin, K. and Manning, J. Polysemy and the Subjective Lexicon: Semantic Relatedness and the Salience of Intraword Senses.

D. Language Learning 39(4)

- 1) Hansen-Strain, L. Orality/Literacy and Group Differences in Second Language Acquisition.
- 2) Gass, S.M. Language Universals and Second Language Acquisition.

E. Language and Speech 32(2)

- 1) Dijkstra, T., Schreuder, R. and Frauenfelder, U.H. Grapheme Context Effects on Phonemic Processing.
- 2) Brady, S., Poggie, E. and Rapala, M.M. Speech Repetition Abilities in Children who Differ in Reading Skills.
- 3) Flege, J.E. Differences in Inventory Size Affect the Location but not the Precision of Tongue Position in Vowel Production.
- 4) Vihman, M.M. and Velleman, S L. Phonological Re-organisation. A case study.

F. Linguistics 281(1)

- 1) Rijkhoff, J. Explaining Word Order in the Noun Phrase.
- 2) Davis, S. Italian Onset Structure and the Distribution of 'il' and 'lo'.
- 3) De Jong, D. The Syntax-Phonology Interface and French Liaison.
- 4) Tanaka, T. Semantic changes of CAN and MAY: Differentiation and implication.
- 5) Craig, D. and Pitts, M.K. The Dynamics of Dominance in Tutorial Discussions.

Literature Papers

J. Essays in Criticism 29(4)

- 1) Roman, F. Shakespeare and the New Historicism.
- 2) Ellis, D. Finding a Part for Parolles.
- 3) Gard, R. Lady Susan and the Single Effect.

K. Studies in English Literature 1500-1900 30(1)

- 1) Kintgen, E. Reconstructing Elizabethan Reading.
- 2) Green, R. Sir Philip Sidney's "Psalms", the Sixteenth-Century Psalter, and the Nature of Lyric.
- 3) Erler, M. Davies's Astraca and Other Contexts of the Countess of Pembroke's "A Dialogue".
- 4) Clark, J. A. The Plot of Donne's "Anniversaries".
- 5) Matan, N. George Herbert, Henry Vaughan, and the Conversion of the Jews.

L. Modern Drama 32 (4)

- 1) Parker, B. Strindberg's 'Miss Julie' and the Legend of Salome.
- 2) Tufts, C.S. Prisoners of their Plots: Literary Allusion and the Satiric Drama of Self Consciousness in Chekov's 'Three Sisters'.
- 3) Leach, R. Brecht's Teacher.
- 4) Zatlin, P. Lopez Rubio and the Well-Made Metaplay.
- 5) Klaver, E. The play of Language in Ionesco's 'Play of Chairs'.

M. The Modern Language Review 84(4)

- 1) Boase, R. The "Penitents of Love" and the Wild Man in the Storm: A Passage by the Knight of La Tour-Landry.
- 2) Pensom, R. Narrative Structure and Authenticity in 'L'Immoraliste'.
- 3) Ormrod, R. Gabriele D'Annunzio and Radclyffe Hall.
- 4) Jordan, P. Goytisolo's 'Juan sin tierra': A Dialogue in the Spanish Tradition.

- 5) Webber, A. The Uncanny Rides Again': Theodore Storm's Double Vision.
- 6) Bond, D.G. The Dialogue form of Uwe Johnson's 'Mutmassungen uber Jakob'.

N. American Literature 61 (4)

- 1) McKelly, J.C. For Whom the Bull Flows: Hemmingway in Parody.
- 2) Gunn, D.W. The Monomythic Structure of 'Roughing It.'
- 3) Sumida, S. Re-evaluating Mark Twain's Novel of Hawaii.
- 4) Cheatham, G. Death and Repetition in Porter's Miranda Stories.
- 6) Mellard, J.M. Flannery O'Connor's "Others": Freud, Lacan, and the Unconscious.

O. Studies in Philology 86(3)

- 1) Clopper, L.M. The life of the Dreamer, the Dreams of the Wanderer in 'Piers Plowman'.
- 2) Farrell, R.S. The Style of the 'Clerk's Tale' and the Function of its Glosses.

Science Papers

P. Plant Physiology (1990) 92

- 1) Servaites, J.C. Inhibition of Ribulose 1, 5-biphosphate Carboxilase/oxygenase by 2-carboxyarabinitol-1-phosphate.
- 2) Preis, J., Danner, S., Summers, P.S., Morell, M., Barton, C.R., Yang, Y., and Nieder, M. Molecular Characterisation of the Brittle-2 Gene Effect on Maize Endosperm ADP Glucose Pyrophosphorylase Subunits.

Q. Sedimentary Geology (1990) 67

- 1) Hart, B. S: and Long, B.F. Storm Deposits from the Quaternary Outardes Delta, Quebec, Canada.
- 2) Straccia, F.G., Wilkinson, B.H. and Smith, G.R. Miocene lacustrine Algal Reefs - Southwestern Snake River Plain, Idaho.
- 3) O'Brien, N. Significance of Lamination in Toarcian (Lower Jurassic) Shales from Yorkshire, Great Britain.

- 4) Cawood, P.A. Provenance Mixing in an Intraoceanic Subduction Zone: Tonga Trench - Louisville Ridge Collision Zone, Southwest Pacific.
- 5) White, J.D.L. Depositional Architecture of a Maar-pitted Playa: Sedimentation in the Hopi Buttes Volcanic Field, Northwestern Arizona, USA.
- 6) Decher, K. Plate Tectonics and Pelagic Facies: Late Jurassic to Early Cretaceous Deep Sea Sediments of the Ybbsitz Ophiolite Unit (Eastern Alps, Austria).

R. Journal of Inorganic Biochemistry (1990) 39

- 1) Chakraborty, D. and Bhattacharya, P.K. Intramolecular Interligand Interactions in Cu (II) Ternary Complexes Involving Dipeptides and Amino Acids.
- 2) Bertini, I., Luchinat, C., Monnanni, R., Moratal, J., Donaire, A., and Auld, D.S. Azide and Chloride Binding to Carboxypeptidase A in the Presence of L-phenylalanine.
- 3) Sunkiss, K., Taylor, M. G. and Greaves, G.N. Form of the Anion in the Intracellular Granules of the Crab.
- 4) Deia, S., Gessa, C., Manuna, B., Piu, P. and Seeber, R. Iron (III) Reduction by D-galacturonic Acid. Part I Influence of Copper (II) Complexes Formation.
- 5) Tajmir Riahi, H.. A.. Carbohydrate Complexes with Alkaline Earth Metal Ions. Interaction of D-glucono-1, 5-lactone with the Mg (II), Ca (II), Sn(II) and Ba(II) Captains in the Crystalline Solid and Aqueous Solution.

S. Genetics (1990) 125

- 1) Leppert, G., McDevitt, R., Falco, S. C., Van Dyk, T.K., Ficke, M. B. and Golin, J. Cloning by Gene Amplification.
- 2) Salmeron, Jr., J.M., Leuther, K.K. and Johnston, S.A. GAL Mutations that Separate the Transcriptional Activation and GAL 80-interactive Functions of the Yeast GAL 4 Protein.
- 3) Barton, M.K. and Kimble, J. 'Fog-1': A Regulatory Gene Required for Specification of Spermatogenesis in the Germ Line of *Caenorhabditis Elegans*.

T. Contemporary Physics 30 (6)

- 1) Salaneck, W.R. Conformational Defects in a Conducting Polymer.
- 2) Backenstoss, G. Antiprotonic Atoms.

U. Solar Physics (1990) 126

- 1) Neckel, H. and Labs, D. Variations of 'Wavelengths' and 'Bisector Indices' of 70 Solar Spectral Lines Between 3300 and 3960 A in Kitt Peak FTS Spectra.
- 2) Sine, D. G. and McCabe, M.K. The Structure of White-Light Corona and the Large-Scale Solar Magnetic Field.
- 3) Van Driel-Gesztelyi, L. and Petrovay, K. Asymmetric Flux Loops in Active Regions.
- 4) Howard, R.F. The Magnetic Fields of Active Regions.
- 5) Keenan, F.P. NIV Line Ratios in the Sun.
- 6) Priest, E..R. and Forbes, T.G. Magnetic Field Evolution During Prominence Eruptions and Two-ribbon Flares.

V. Botanical Journal of the Linnean Society. (1990) 102

- 1) Kato, M. Ophioglossaceae: A Hypothetical Archetype for the Angiosperm Carpel.
- 2) Leadley, E.A. and Heywood, V.H. The Biology and Systematics of the Genus *Coincya* Porta and Rigo ex Rouy (Cruciferae).

