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Factors Affecting Discourse Structure and Style in Biomedical Discussion Sections

Ian A. Williams
University of Cantabria
Spain

1. Introduction

Over the last three decades or so, increasing interest has been paid to scientific discourse, and in particular to the research article, from a variety of perspectives. Sociological studies (Gilbert & Mulkay, 1984; Latour & Woolgar, 1979) established that the research article is not an objective representation of scientific enterprise as it is performed, but a rhetorical artefact that seeks to construct knowledge and persuade readers to accept the validity of the claims made by writers, and thus to promote the personal and professional interests of the researchers and research groups (Hyland, 1998). Gilbert & Mulkay (1984) showed that scientists have two ways of representing science: a formal "empiricist repertoire" expressed through impersonal public statements of evidence and procedures, and an informal "contingent repertoire" that stresses personal and social factors and which they use to discuss their discipline and practices among themselves in less restricted and private settings. Myers (1994) refers to the *narrative of science*, which researchers use when writing up their research for publications in journals for their peers: "they follow the argument of the scientist, arrange time into a parallel series of simultaneous events all supporting their claim, and emphasize in their syntax and vocabulary the conceptual structure of the discipline" (Myers, 1994). In contrast, Myers found that the same scientists used the *narrative of nature* to popularise their research for a less specialised audience; in this sequential narrative "the plant or the animal, not the scientific activity, is the subject, the narrative is chronological, and the syntax and vocabulary emphasize the externality of nature to scientific practices" (Myers, 1994).

Other studies (Knorr-Cetina 1981; Myers 1985) have investigated the changing shape of research articles and their discourse as they passed through the peer review system. Myers (1985) found that while the biologists he studied always sought to achieve the highest level claim they could, they inevitably had to lower their aims and accept a lower level. Knorr-Cetina (1981) performed a textual study tracing writing of a paper from laboratory notes to the final draft, and found that the Introduction and Discussion sections were those that underwent the greatest transformation. Again the language had to be carefully modified by eliminating "dangerous" claims and excessive speculation. These case studies, therefore, show how the discourse is reconstructed in the negotiation process and support the artefactual nature of the scientific article.

It is pertinent here to return to Latour and Woolgar's 1979 study since in their analysis of statements in scientific discourse, they sought to establish a hierarchical taxonomy of

knowledge claims, distinguishing five statement types according to the degree of certainty conveyed. Knowledge represented by type 5 is not actually stated but presupposed and refers to that wealth of knowledge that is shared by experts and is so obvious that in the context does not require expression. Type 4 statements are explicit assertions on uncontroversial subject matter that are more typical of textbooks than research articles: "Two anatomicoclinical variants of pemphigus have been recognized according to the suprabasal or superficial site of the blister: pemphigus vulgaris and its rare vegetating form, pemphigus vegetans, on the one hand, pemphigus foliaceus on the other". Type 3 statements express uncertainty through signals that indicate that the information they convey cannot be taken for granted. This may be achieved by simple attribution to the source through the citation system: "In fact, lesional OCP [ocular cicatricial pemphigoid] tissue is characterized by a marked infiltration of T cells (including interleukin 2 receptor-positive activated T cells), Langerhan's cells, and macrophages,[44-46] similar to those of lichen planus.[47]" Removal of the citation sources transforms type 3 into type 4. Type 2 statements are far more tentative, and contain a wide range of linguistic devices denoting the uncertainty of the status of the claim: "The significantly increased frequency of IgA deposits in this subset as well as the antigenic specificity of the IgA autoantibodies to BP Ag in these patients,[21] suggest that the occurrence of mucosal lesions in anti-BP Ag mucosal pemphigoid may be related to the development of IgA autoantibodies." Type 1 statements are even more speculative in nature: "One could speculate that this difference in apneic pause frequency is related to the fact that approximately 50% of these black children, who were healthy siblings of children with sickle cell anemia, can be expected to have sickle trait (Hb AS)." Hyland (1998), while accepting the validity of this transformation of speculation and knowledge claim from the research article to textbook knowledge and beyond, criticises the scale in that it does not offer a systematic framework for analysis, nor do the authors provide sufficient authentic examples, or support their classification empirically.

Parallel to these sociological developments, linguistic analysis of scientific discourse and the research article has also progressed over this period. From the early attempts at classifying linguistic components of scientific discourse, such as verb forms and tense, *that* nominals, and use of the passive voice (Barber, 1962; Tarone et al., 1981; West, 1980; Wingard, 1981), there came a major shift in orientation with the pioneering work of Swales (1981). In this work, the author took the concept of Move, hitherto used to analyse oral discourse (Sinclair & Coulthard, 1975), and applied it to written text, the Introduction section of research articles across several disciplines. Move analysis essentially assigns a function to a stretch of text, and identifies its typical exponents or manifestations. If a pattern emerges, it is tested on further texts. Swales initially identified four moves that appeared in the Introduction section in a generally regular way. The author later revised the 4-move model, replacing it with a modified 3-move system called the Create a Research Space (CARS) model (Swales, 1990), and based on an ecological metaphor: establish the field, create a niche and occupy the niche. Swales' models, whether the 4-move or 3-move version, have been verified as valid, albeit with certain variations, for a number of disciplines (Cooper, 1985; Crookes, 1986; Peng, 1987). Move analysis has also been applied to other sections such as Results (Brett, 1994; Williams, 1999) and Discussion (Dudley-Evans, 1994; Hopkins & Dudley-Evans, 1988; Williams, 2009), or to the whole research article (Nwogu, 1997; Skelton, 1994; Swales, 2004). Together with this increasing interest in the macrostructure of the research article and the rhetoric of the individual sections, other researchers have examined specific aspects of this discourse, such as reporting verbs (Thomas & Hawes, 1994; Thompson & Ye, 1991);

citation (Thomas, 1991); evaluation (Hunston, 1994), and hedging (Salager-Meyer, 1994; Hyland, 1998). As a result, there is now a rich reservoir of linguistic data on which to base empirical research of large quantities of text using electronic corpora and computer-based methods and tools.

With regard to the Discussion section, Move analysis was first applied by Belanger (1982) and McKinlay (1982). McKinlay studied Discussions in medical articles and identified a 4-move structure consisting of background information, statement of result, interpretation of result, and conclusion. This system was validated for Spanish by Vásquez (1987). While other systems, generally with few Moves, have emerged (Kanoksilapatham, 2003; Lewin *et al.*, 2001; Nwogu, 1997), the most elaborate model is that of Hopkins and Dudley-Evans (1988), an 11-move system identified in the Discussions of biology Master's dissertations. Dudley-Evans (1994) revised this model, reducing it to a 9-move model, which is valid for both theses and research article Discussions. In previous studies on the Discussion section (Williams, 2005; Williams, 2009), we have validated the system for both English and Spanish biomedical articles.

Using the system, Dudley-Evans (1994) states that the moves are combined in different ways according to the writers' communicative needs and that cycles usually have a result or finding as head, followed by reference to previous research, or a claim also followed by a reference to previous research. However, the order of pairs of moves can also be reversed. Mauranen (1993) used a simpler model and compared the discourse style of Finnish authors writing in their native language and writers publishing their work in English-language journals. She identified two contrasting styles referred to as "progressive" and "retrogressive", depending on whether the writer placed the main point of the Discussion towards the end or at the start of the section. Finnish writers preferred the progressive style whereas the English-language authors preferred the retrogressive style. In our previous study (Williams, 2009) using Dudley-Evans model, we were able to show this same trend on comparing English-language and Spanish publications. Some 70% of Spanish authors preferred the progressive style and about 58% of the writers in English-language journals used the retrogressive style. However, in that study, the main criterion for classification was the presence of background information, which is not always a reliable guide for the discourse style. In addition, owing to the selection of the English-language subcorpus, this includes both native and non-native writers of English, which was not taken into account. Thirdly, the only criterion for the selection of studies was that they conform to the Introduction-Methods-Results-and-Discussion (IMRAD) format, which covers many different study designs so that this factor may also have an influence on choice of discourse style.

The aim of the present study is to re-examine the discourse style in the English-language and Spanish research articles by applying strict criteria for the identification of the styles, to compare the non-native writers of English with the native authors, and to investigate the influence of study type on the choice of style.

2. Move analysis in the discussion section

The Move analysis for this study was based on the categories established by Dudley-Evans (1994: 225), the descriptions of which have been slightly modified to take into account differences between the progressive and retrogressive discourse styles. The denominations of the nine moves and their subdivisions or "steps" together with the descriptors are shown in table 1.

Background information (Move 1) is a free-floating move that can be found anywhere in the Discussion, but is generally placed at the start of the whole section, subsection or paragraph especially in the progressive discourse style. When background information combines with other moves and is placed after them, it is interpreted as supporting or justifying the statements made in them. Therefore, when a reference to previous research appears in initial position (Move 5a), it is interpreted as providing background information based on one or more studies, a type 3 statement in Latour and Woolgar's typology (1979) but more limited in scope and truth value than contextual information presented as a consensus view, that is their type 4 statement. In contrast, reference to previous research placed after other moves will perform one of the other two functions of this category: comparison of results or findings (Move 5b) and support for claims, explanations and recommendations (Move 5c).

No.	Move and Step	Description
1.	**Information move:** **BI**	- Introduces background information (BI) about theory, aim of the research, methodology used, or previous research (see Move 5a) that is necessary for interpreting the results and findings of the current study.
2.	**Statement of results:** **SOR**	- Often the first move of a cycle: presents a numerical /statistical result from the previous Results section for comment.
3.	**Statement of findings:** **SOF**	- Presents a finding or observation from the Results section for further comment or elaboration: findings are expressed in more general terms than SORs.
4.	**(Un)expected outcome:**	- A special kind of SOR or SOF indicated by comment on the fact that the result is expected or, more usually, unexpected or surprising. Unexpected findings usually require an explanation.
5.	**Reference to previous research: RPR** a) BI b) comparison c) support	- a) Provides the basis for BI, or may constitute the BI itself - b) Combines with SORs/SOFs for comparison (similarity or contrast) - c) Provides support for claims, explanations, and recommendations.
6.	**Explanation**	- Gives a reason for an unexpected outcome or a result/finding that differs from those previously reported, but they may follow other categories (claim or limitation).
7.	**Claim** a) deduction b) hypothesis	- The more general statements arising from the results, and representing the contribution of the article to the research field; a) deductions are more strongly expressed than b) hypotheses.
8.	**Limitation**	- Indicates that aspects of the research (methodology, findings or claims) should be treated with caution: i.e. they restrict the application or interpretation in the more general setting.
9.	**Recommendation**	- Suggestions for future research, for improvements in methodology, for application of the results.

Table 1. Rhetorical Moves in the Discussion section modified from Dudley-Evans (1994)

Statements of findings (Move 3) are expressed in more general terms than numerical statements of results (Move 2). The type of finding is influenced by the kind of study, but there will not be a strict correlation between study type and finding (see Williams, 1999). Comparisons are common in many discussions, but especially in case-control studies and those examining two types of intervention. Findings expressing relationships between different variables are also common to several study designs, but are particularly characteristic of parametric and epidemiological studies that seek to determine effects between factors and a predetermined outcome or invariable factor such as mortality. Time-related findings are typical of longitudinal studies and those comparing pre-treatment and post-treatment levels. In descriptive studies such as those investigating histopathological characteristics, the finding may simply describe what was observed.

The appearance of certain moves in the Discussion often predicts the subsequent presence of another (Tadros, 1994). Thus, references to previous research that conflict with the data of the new study (Move 5b) and unexpected outcomes (Move 4) require subsequent explanation (Move 6) on the part of the authors. Similarly, a limitation (Move 8) on an aspect of the study design, methodology or results is almost always followed by a reply, or counter claim (Move 7), that justifies or attenuates to some degree the impact of the limitation. In both situations the authors by introducing the first Move of the pair into the discourse are seen to acquire a commitment to their readers to provide the second explanatory or damage-limiting Move.

According to Dudley-Evans (1994), the moves are selected and combined in different ways into cycles depending on whether the focus is placed on a result, a finding or a claim. Despite the varying combinations, he did not identify the overall progressive and retrogressive patterns, which Mauranen (1993) discovered in her comparison of native Finnish writers and authors publishing in English-language journals. In a previous study (Williams, 2009), we were able to confirm these different discourse styles in a contrastive study of native Spanish writers and authors publishing in eight English-language journals. The advantage of our study was the size of the corpus (64 research articles per subcorpus) and that the samples were randomly selected to avoid bias. The two discourse styles and the possible combination patterns are represented in figures 1 and 2.

The progressive style (figure 1) typically opens with background information at a general level, followed by details of more specific aspects of previous research and sometimes those relating to the design and methods of the current study. Individual results or findings are then presented and compared to previous research with evaluative comments following. If a result is unexpected, and when there is a discrepancy between current and previously reported findings, an explanation will almost invariably follow. Comparisons and explanations lead on to the main interpretative category of the claim. Explanations and claims, especially the more tentative hypotheses, may be supported by data drawn from external sources. Recommendations, when present, generally appear at the end of the discussion or of an intermediate cycle. Thus, the progressive pattern is iconic and displays a linear chronological sequence.

The retrogressive style (figure 2) places the major claim or claims at the opening of the Discussion, although these may be preceded by some background information. The claims are then explained or justified in relation to evidence available in the current results and findings and in previous research. Discrepancies will again be accounted for, and the significance of the study will be established in the wider context of the field of interest through the formulation of new hypotheses, again supported by data from outside or within the study, and by means of suggestions for practical applications or recommendations for future lines of research.
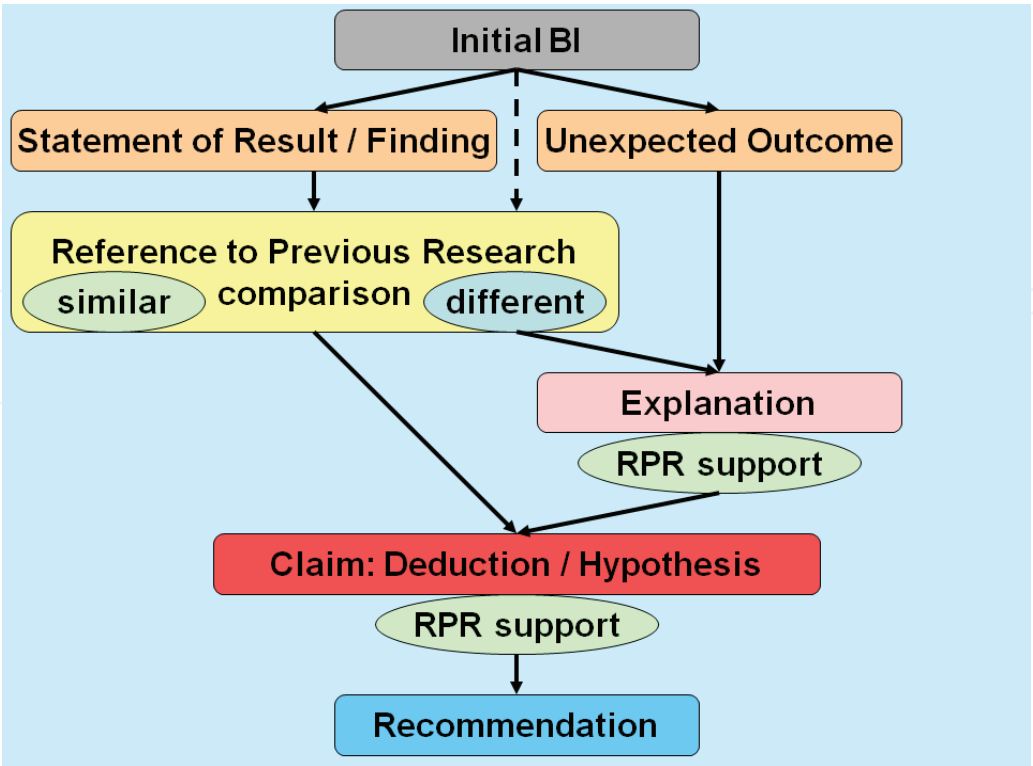
Fig. 1. Pattern of the progressive discourse style in the Discussion section of biomedical research articles
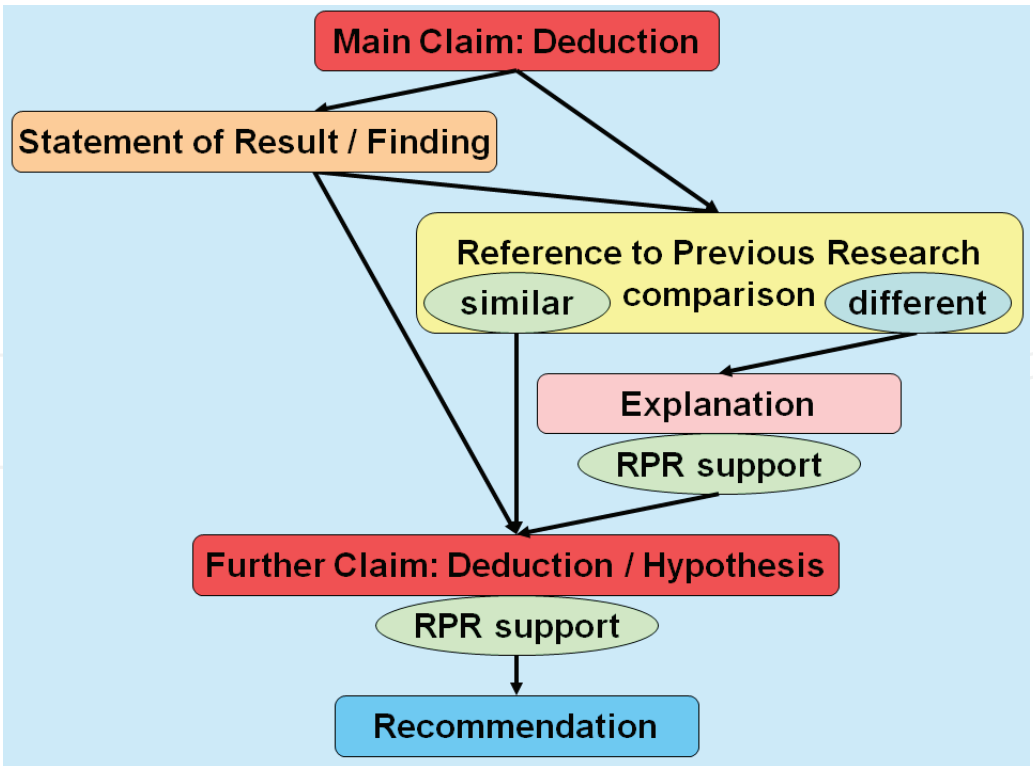

Fig. 2. Pattern of the retrogressive discourse style in the Discussion section of biomedical research articles

For a better understanding of how the Move system works, we provide a worked example of a complete Discussion taken from the English language subcorpus. This discussion section has been chosen as an illustration since it includes a wide range, if not all, of the Moves shown in table 1. The discussion consists of ten paragraphs (marked by the # symbol).

# S1	M7 Claim	# This study demonstrated that oral prednisone was efficacious in reducing the need for hospitalization among a subset of children treated in the ED [emergency department] for acute asthma.
S2	M3 SOF	This benefit was achieved within 4 hours of prednisone's administration and was seen among patients treated frequently with β_2-agonist aerosols.
S3	M5 RPR comparison M6 Explan	There have been several recent studies showing corticosteroids to be efficacious in the management of acute asthma, but none demonstrated the efficacy of oral therapy in the ED and none showed a corticosteroid benefit in the setting of frequent β_2-agonist therapy.
S4-S5	M5 RPR comparison	Storr et al.[16] randomly assigned 140 children hospitalized with acute asthma to receive oral prednisolone or placebo soon after admission. At a median time for reexamination of 5 hours, 30% of patients in the prednisolone group were discharged to home compared with 3% in the placebo group (P <.0001).
S6	M6 Explan	However, since these patients were relatively undertreated with β_2-agonists, a steroid benefit in addition to that achieved with frequent β_2-agonist therapy alone was not demonstrated.
S7-S8	M5 RPR comparison	Tal et al.[12] randomly assigned 74 children between 6 and 60 months of age in the ED with acute wheezing to receive either 4 mg/kg of intramuscular methylprednisolone or placebo. After 3 hours, 20% of steroid-treated patients required hospitalization compared with 43% in the control group (P <.05).
S9-S10	M6 Explan	However, these patients were also relatively undertreated with β_2-agonists, perhaps making it possible to discern a steroid benefit. Also, it is feasible that some of the younger infants were wheezing secondary to bronchiolitis and that such patients may respond differently to corticosteroid therapy than do older children with asthma.
S11-S12	M5 RPR comparison	Littenberg and Gluck[13] randomly assigned 97 adults in the ED with acute asthma to receive either 125 mg of intravenous methylprednisolone or placebo. Only 19% of steroid-treated patients required hospitalization, compared with 47% in the control group (P <.003).
S13-S14	M6 Explan	However, an early clinical benefit after steroid

		administration was not shown since patients were treated for up to 12 hours in the ED. Also, patients only received β_2-agonist aerosols every 2 hours.[17]
S15-S16	M5 RPR comparison	In contrast, Stein and Cole[15] treated adults with acute asthma with 125 mg of intravenous methylprednisolone or placebo, followed by frequent β_2-agonist aerosols. They found no difference in hospitalization rates between the two groups.
S17	M6 Explan	However, the failure to detect a steroid benefit was most likely the result of the administration of methylprednisolone to some patients in the placebo group, rather than the use of aggressive β_2-agonist therapy.[17]
#S18	M1/5 BI	# A recent meta-analysis of steroid therapy concluded that the oral and intravenous routes are equally efficacious in the initial hours of treatment of acute asthma.[18]
S19	M1/5 BI	In fact, Ratto *et al.*[19] found no significant differences in pulmonary function tests 6 hours after steroid dosing among hospitalized adults treated with oral and intravenous steroids.
S20-S21	M1/5 BI	Engel *et al.*[20] randomly assigned hospitalized adults to receive either intravenous methylprednisolone or oral prednisone. There were no significant differences between the two groups as assessed by hourly measurements of peak expiratory flow during the first 24 hours after admission.
#S22	M1/5 BI	# In a recent review of a 1-year experience at a children's hospital, it was found that only 4% of 3358 children with acute asthma received systemic steroids in the ED, yet 26% were ill enough to require hospitalization.[21]
S23	M1 BI	Establishing intravenous access in a child is often labor-intensive, time-consuming, and painful and may be a primary reason for the underutilization of corticosteroids in the ED.
S24	M7 Claim	The principal benefit of oral prednisone, then, may be that moderately ill patients will receive corticosteroid therapy more consistently and more promptly.
#S25	M1 BI	# There are several aspects of the present study that deserve further comment.
S26	M8 Limit	This study did not attempt to find the time needed for prednisone's peak clinical effect.
S27	M1/5 BI	Recent National Institutes of Health guidelines state that a patient's ED disposition should be decided 2 hours after steroid administration.[22]
S28	M7 Claim	In our study, a similar percentage of patients in each group would have been hospitalized had therapy been restricted to 2 hours.

S29-S30	M2 SOR	However, more than half of those prednisone-treated patients who would have been hospitalized after 2 hours were able to be discharged to home within the next 2 hours; yet hospitalization was prevented in only 17% in the placebo group.
S31	M1 BI	Both groups continued to be treated with frequent β_2-agonists after the 2-hour preliminary disposition was rendered.
S32	M6 Explan (M5 RPR support)	Presumably, then, the lower hospitalization rate for prednisone-treated patients reflected the onset of action of prednisone after the initial delay known to occur with corticosteroid therapy.[23-25]
S33	M7 Claim	It is possible that with a longer period of treatment the prednisone group would have had an even lower hospitalization rate.
S34	M1 BI	However, 4 hours was considered to be a reasonable duration to treat sick asthmatic patients within the constraints of most busy EDs.
S35	M1 BI M3 SOF	# It was decided to stop the study earlier than originally planned when, after an interim review by the study investigators, it was found that three of four study outcomes achieved statistical significance in favor of the use of prednisone.
S36	M7 Claim M1/5 BI + RPR	Based on our data and that of others,[12-14,16] it seemed unethical to fail to treat moderately ill asthmatic patients with corticosteroids, even though this represented the standard of care at this and other centers at the time.[18]
S37	M4 UnexpO	As a result of stopping the study prematurely, the overall hospitalization rate between the two groups did not achieve statistical significance ($P = .10$).
S38	M6 Explan	This failure to achieve statistical significance reflects the observation that many patients experienced a prompt clinical benefit from β_2-agonist aerosols only and were able to be sent home without the need for corticosteroid therapy.
S39	M1 BI M3 SOF	When we considered only those patients with an initial suboptimal response to β_2-agonist therapy, there was a significantly lower hospitalization rate for the prednisone group.
S40	M1 BI M9 Rec	Since it is not possible to preselect those patients who will respond promptly to β_2-agonists, we would advocate treating all moderately ill asthmatic children with prednisone.
#S41-S42	M1/5 BI	# The PI [pulmonary index] is a clinical asthma score that has been shown to correlate significantly with objective pulmonary function studies and hospitalization rates in children older than the age of 6 treated for acute asthma.[26]

		Subsequently, it has been used in the assessment of younger children.[12]
S43	M1 BI	Since our patient population had a wide age range, we modified this PI by adding a second respiratory rate scale.
S44-S45	M1/5 BI M1 BI	Also, since others have shown that oxygen saturation correlates with clinical scores, pulmonary function tests, and the need for hospitalization in children with acute asthma,[27-29] we included oxygen saturation as an additional piece of objective data. It was felt that the modified index, while closely approximating that which has been validated, would better serve as a tool to identify moderately ill children in our patient population.
S46	M3 SOF	In fact, it was found that patients requiring hospitalization had a significantly higher median PI than those who were able to be sent home.
S47	M2 SOR	Also, there was 83% interobserver agreement among the four study investigators assigning PI scores to patients (κ statistic).
#S48	M3 SOF	# There was some overlap among patients with an initial PI greater than 10 and those given a preliminary disposition of "admit".
S49	M2 SOR	However, although there were 24 patients who met both of these criteria, an additional 30 patients met one, but not both, of these criteria.
#S50-S52	M1 BI	# The need for hospitalization was based on the physical examination conducted by the blinded investigators. Guidelines used for admission decisions included an oxygen requirement, continued significant retractions, or continued poor aeration. More explicit criteria for admission were purposely avoided in order to simulate the decision-making as it is carried out in most EDs: that is, reliance on clinical judgment.
S53	M1/5 BI	Also, the lack of explicit admission criteria is consistent with other studies assessing the efficacy of corticosteroids for the ED treatment of asthma.[12,13,15]
S54	M7 Claim M2 SOR	It is not likely that patients who should have been hospitalized were sent home, since none of the 45 patients discharged from the ED relapsed within the first 48 hours.
#S55	M3 SOF M2 SOR	# The capsules used in this study were relatively well tolerated and in no case was a patient too ill to accept oral medication.
S56-S57	M2 SOR	Six (15%) of 39 patients vomited prednisone, and 3 of these patients also vomited the subsequent dose. One placebo-treated patient vomited both the initial and subsequent doses of drug.
S58	M2 SOR	These four patients were excluded from analysis because

	M6 Explan	they, in effect, did not receive the study medication.
#S59	M7 Claim	# In summary, this study demonstrated that oral prednisone was efficacious in reducing the need for hospitalization among a subset of children treated in the ED for acute asthma.
S60-S61	M3 SOF	Benefiting most from prednisone therapy were the sickest cohort of patients and those who had suboptimal responses to initial β_2-agonist therapy. These benefits were achieved within 4 hours and were obtained in patients treated frequently with β_2-agonist aerosols.
S62	M9 Rec	Future studies will be needed to substantiate these results, to determine the optimal prednisone dosing, and to compare the oral and intravenous routes of corticosteroid administration in the ED treatment of acute asthma.
S63	M9 Rec	Based on our current knowledge and given the inherent advantages of oral vs parenteral therapy, we recommend that the prompt use of oral prednisone be considered for any moderately ill child with acute asthma.

Sample text 1. Move analysis of a complete Discussion section displaying the retrogressive discourse style

In commenting on this text, we will focus on each of the Move categories in turn and indicate both the features that are typical and those considered to be more personal expression of the repertoire of Moves available. It should be pointed out that this text illustrates the retrogressive style and can be divided into a number of subsections or cycles. The main cycle extends over the first three paragraphs up to sentence 24. A second large cycle covers the next six paragraphs (S25-S58), but as stated in S25 covers several aspects of the study. These subdivisions deal with the questions of the duration (2 hours or 4 hours) of treatment in the emergency department (S26-S34), the influence of stopping the trial prematurely (S35-S40), the relationship between the pulmonary index and hospitalisation (S41-S54), and tolerance of the study drug (S55-S58). In the last paragraph (S59-S63) the authors give their conclusions.

The text includes 12 manifestations of background information (Move 1). Of these, one (S25) is a presentational sentence introducing the four aspects dealt with in the second part of the discussion. Two others provide general contextual knowledge, the first (S23) serving as the basis for a claim and the second (S40) providing the rationale for a recommendation. Both are expressed in the typical present tense. The most frequent function of this move (8 instances) is to present methodological choices and the underlying rationale. While these decisions can be described and justified in the Methods section (Williams, 2010), it is not unusual for authors to delay commenting on them until the discussion section. The selected procedural choices are expressed in the past tense (*continued to be treated, modified, included, was based*), and use of the first person (S43, S44) underlines the fact that the decision deviates from what is considered standard practice. The first person draws attention on to the investigator, leaving readers to judge for themselves the validity of the choice (Hyland, 1998). The underlying rationale, when present, is also expressed in the past but through cognitive verbs (*was considered, was decided, was felt*). The final instance occurs in the conclusion in the last sentence (S63), where general knowledge and the personal experience of the authors are combined to serve as the basis for the final recommendation.

Use of reference to previous research to provide background information (Move 1/5a) is also common in this discussion (11 instances). The typical manifestations of this move are mention of the cited authors (*Ratto et al., Engel et al.*) or an authority (*National Institutes of Health*), general reference to investigators (*other authors*) or institutions (*other centers*), replacement of researchers by the research (*meta-analysis, review, studies*), or use of the impersonal passive (*it has been shown*). When individual studies are cited, the past tense is used (*concluded, found*) whereas citation of an official source can be expressed in the present (*state* S27). When several studies are cited (S44) or when the reference has greater relevance to the current study (S41, S42), the present perfect is the preferred choice (*has been shown, has been used*).

The text includes eight manifestations of numerical statement of results (Move 2). However, none of these open a cycle for discussion; they all follow more general findings (S47, S49, S55-57) or a claim (S29-30) and provide the concrete data that support the validity of those statements. All the results are expressed in the canonical past tense.

More general statements of findings (Move 3) also appear in the text on eight occasions. Unlike the numerical results, these findings could initiate the comment cycle either at the beginning of a paragraph (S48) or after background information (S35, S46, S55), but two findings (S2, S39) validate a claim or an explanation. The findings presented in S60-61 in the conclusion are a restatement of the data given in S2 and also support the main claim of the study. All the findings, like the results, appear in the canonical past tense. The findings include time-related changes (S2, S61), comparisons (S39, S46), relationships (S35, S48), and evaluative observations (S55, S60).

One statement (S37) was classed as an unexpected outcome (Move 4). Although this is not signalled by the authors with any of the typical indicators (*surprising, unexpected, contrary to expectations*, etc.), its status can be deduced from the discourse. Since it refers to the main outcome of the study (hospitalisation rate in the whole study group), it can be assumed that, as with the other three results (S35), the investigators expected to find a statistically significant difference between treatment with the drug and administration of a placebo. However, this did not materialise. The fact that this finding is followed immediately by an explanation is a further indication of its unexpectedness.

References to previous research functioning as comparisons (Move 5b) or support (Move 5c) are also present in the text. The five examples of the former all appear in the long opening paragraph (S3, S4-5, S7-8, S11-12, S15-16). The first provides an overview of relevant previous research (*several recent studies*), and the remainder all cite the authors by name. The opening general reference is in the typical present perfect (*have been*) whereas each specific study is described in the canonical past tense. The single instance of a citation providing support (S32) serves to validate the explanation in which it is embedded.

There are a total of eight explanations (Move 6) in the text. The first five of these (S3, S6, S9-10, S13-14, S17) follow the comparisons with previous research in which differences with the current study are established. All are signalled by a contrastive marker (*but, however*). The repeated pattern – a brief description of a study followed by an evaluation pointing out the differences – appears to be the authors' personal choice. The overall rhetorical effect of this strategy is to boost the claim of originality for the current study. The explanation in S32 is similar but accounts for apparently inconsistent findings within the current study, the hypothetical non-significant 2-hour result compared with the actual statistically significant 4-hour result. Similarly, the explanation in S38 accounts for the unexpected outcome. The final explanation (S58) justifies the decision to exclude six patients from the analysis; these

adjustments to the study sample may require explanation because they can introduce bias into the analysis. When the study under consideration, previous or current, is referred to, the past tense is used, but the explanation may be attenuated by hedges such as *perhaps, possible, feasible, may respond, most likely* and *presumably* (S9-10, S17, S32) or strengthened by boosters such as *in effect* (S58). Explanations are also marked by causality, through verbs such as *reflect* (S32, S38) and connectors *since* (S6, S13) and *because* (S58).

Claims (Move 7) are or should be the most important statements in the Discussion since it is through them that authors declare that their research is making a novel contribution to knowledge and assert their right to this intellectual property. Of the seven claims in the discussion under study, only two are strongly asserted, the opening claim (S1) and a verbatim repetition in the conclusion (S59). This claim is presented in an almost prototypical formula – *This study demonstrated that...* – in which the authors are replaced by their research, the strongest possible verb is used (*demonstrate*), and only slight attenuation is evident in that the past tense is used rather than the present. This may be because, as we have seen, the main outcome of the study (hospitalisation rate in the total study population) did not achieve statistical significance. The remaining six claims are expressed more tentatively, and are all modified in some way: *may be* (S24), *would have been* (S28), *it is possible* and *would have had* (S33), *seemed unethical to fail to treat* (S36), and *it is not likely* (S54). It is not our intention to examine hedging in detail (see Hyland, 1998, for an in depth analysis), but these attenuated statements anticipate and avoid criticism from peers, on the one hand, and show respect for others' work, on the other. In this regard, the double negative in S36 stands out since a stronger formulation might have caused offence and drawn criticism from hospitals not applying this treatment.

The only limitation (Move 8) identified in this study (S26) displays a typical form for methodological limitations with the verb expressed in the negative (*did not attempt to find*). There is no explicit counterclaim to this limitation, but the ensuing argument (S27-S34) can be taken to fulfil this role; the 4-hour limit of the study design will have allowed sufficient time for the steroid to have exerted its effect.

Three recommendations appear in this discussion, typically placed at the end of a cycle (S40) or at the very end of the article (S62, S63). The final recommendation (S63) is a repetition of that made earlier in S40. They are personalised recommendations for clinical practice signalled by the verbs *advocate* and *recommend* in the first person, and strongly supported by evidence both from the study data and from consensus opinion. The other recommendation (S62) is for further research but notably suggests filling gaps not covered by the current study. It is indicated by typical markers *future studies* and *need*.

The combinations of the different communicative moves in the discussion analysed corresponds to the retrogressive style overall. The section opens with the strongest claim, which is directly linked to the aim of the study expressed in the Introduction: "Therefore, we designed a randomized, double-blind, placebo-controlled trial to assess the efficacy of oral prednisone combined with frequent β₂-agonist therapy for children treated in the ED for moderate, acute asthma exacerbation." For the other subsections, the presence of initial contextual information does not preclude the retrogressive style. In fact, the subcycles on duration of treatment (S26-S34), on the pulmonary index and hospitalisation rate (S41-S54), and on drug tolerance (S55-S58) also display elements of the retrogressive style since numerical results appear after the more general findings and claims which they support, when iconically the opposite would be true: first the data are produced, then they are compared and interrelated statistically, and finally they are interpreted and evaluated. The

only possible exception is the subcycle on the premature stoppage of the trial (S35-S40), where a finding (S35) is placed before a related claim (S36). However, it is unlikely that we will find pure retrogressive or pure progressive discourse styles and what we are concerned with is the style of the major discourse pattern in the Discussion section.

3. Material and methods

3.1 The corpus
The study was carried out on an extensive computerised corpus consisting of 128 research articles with the typical IMRAD format, divided into two subcorpora: a subcorpus of 64 articles (57,650 words) published in eight English-language journals covering the specialities of general medicine (2 journals), cardiology, dermatology, gynaecology and obstetrics, ophthalmology, paediatrics and surgery; and a subcorpus of 64 Spanish research articles (140,250 words) drawn from one or more Spanish journals covering the same specialities as the English-language subcorpus, with eight articles per journal (general medicine) or speciality. The articles were selected in blocks of eight by means of a table of random numbers. The present study used only the Discussion section (English-language texts, 55,360 words; Spanish texts, 59,210 words).

3.2 Analyses
For the analysis of discourse style, the procedure described previously (Williams, 2009) was followed with slight modifications:

Step 1.   Each T-unit, defined as a main clause together with all the subordinate clauses dependent on it (Fries, 1994), was assigned one or more of the Move categories defined in table 1.

Step 2.   The first statement arising from the current results was identified and the Move category noted for χ^2 analysis. The moves of interest were (1) claim, (2) result, finding or unexpected outcome, (3) reference to previous research for comparison, (4) limitation. Unlike our previous study, we included limitations as a separate category in the quantitative analysis despite the small number of occurrences.

Step 3.   The number of T-units preceding the statement identified in step 2 was found and the amount of background information was expressed as a percentage of the whole Discussion section.

Studies with no background information opening with a claim were considered retrogressive, as were those opening with a limitation, followed by a counterclaim with no intervening results or findings, whereas those opening with a result, finding, unexpected outcome or comparison with previous research were classed as progressive. Studies with background information were classified as retrogressive if the background was followed by an early claim (< 25% background information), and where the combination pattern of claim > result or finding > comparison with previous research was clearly evident in the main cycle. When contextual background was followed by a result, finding or comparison, the style was classed as progressive.

In the analysis of native versus non-native writers of English, non-native writers were identified on the basis of the affiliation of first author and co-authors. When all the authors were attached to institutions in countries whose first language is not English, they were classed as non-native writers. For authors whose name suggested they were non-natives (e.g. Chan), their continued affiliation to an institution in an English-speaking country was checked by a computer search.

For the analysis of discourse style in relation to study type, studies were broadly classed using definitions of evidence-based medicine, clinical trial classifications and data for retrospective and prospective studies. On the basis of the data collected, studies were grouped into the following categories: small case series, based on < 30 cases; large retrospective studies, when the studies were defined as such in the Abstract, or in the body of the article; large prospective studies, identified as for retrospective studies; epidemiological studies, when these were population-based, were cohort studies, or were case-control studies defined as epidemiological in the Abstract or body of the text; experimental and investigational studies, which included studies using animal models or in vitro methods and those investigating aspects of medical practice through surveys and questionnaires; and finally clinical trials defined as such in the Abstract or body of the text.

For statistical analysis, categorical variables were compared by χ^2 analysis, with Yates' correction for 2×2 tables. With regard to small expected numbers, Everitt (1977) gives the following conservative rule for this type of analysis: the $2 \times c$ table can be tested by the conventional χ^2 criterion if all the expectations are 1 or greater, and that it may even be used for tables with expectations in excess of 0.5 in the smallest cell. The amount of background information was compared with the Mann-Whitney test. P values ≤ 0.05 were considered significant.

4. Quantitative analysis

4.1 Background information

Some initial background information was included in 45 of the 64 Spanish language studies but in only 31 of the 64 English language articles ($\chi^2 = 5.474$; 1 df; $P = 0.019$). However, the presence of initial background information is not sufficient by itself to indicate the type of discourse style; it is also necessary to take into account the category of the Move that opens the discussion of the data emerging from the new study (table 2). There was a significant difference overall ($P = 0.002$) in the type of Move between the English and Spanish subcorpora. A claim was the preferred choice (35/64; 55%) in the English language texts whereas a statement of results or finding (35/64; 55%) was most often selected in the Spanish texts.

Move	English	Spanish	Total
Claim	35 (24.5)	14 (24.5)	49
SOR	21 (28)	35 (28)	56
RPRcomp	7 (10)	13 (10)	20
Limitation	1 (1.5)	2 (1.5)	3
Total	64	64	128
$\chi^2 = 14.633$; 3 degrees of freedom; $P = 0.002$			
Numbers in brackets are expected values. SOR: statement of result; RPRcomp: reference to previous research for comparison.			

Table 2. Distribution of Move type in the two subcorpora

When the Move type was analysed according to the presence or not of background information, the level of significance ($P = 0.008$) was only maintained for texts with no introductory matter (table 3). In the English subcorpus, the selection of an opening claim was made in two thirds of the texts; in contrast, in the Spanish Texts, the choice between a claim, a result or finding and comparison with previous research was found to be fairly evenly distributed.

Move	English	Spanish	Total
Claim	22 (17.8)	6 (10.2)	28
SOR	10 (10.8)	7 (6.2)	17
RPRcomp	0 (3.2)	5 (1.8)	5
Limitation	1 (1.3)	1 (0.7)	2
Total	33	19	52
χ^2 = 11.755; 3 degrees of freedom; P = 0.008			
Numbers in brackets are expected values. SOR: statement of result; RPRcomp: reference to previous research for comparison.			

Table 3. Distribution of Move type in Discussions with no initial background information in the two subcorpora

For the discussions that opened with background information (table 4), the significance was lost (P = 0.062) although the English language texts again tended to open the commentary with a claim, whereas the Spanish texts showed a strong preference (28/64; 62%) for a statement of result or finding.

Move	English	Spanish	Total
Claim	13 (8.6)	8 (12.4)	21
SOR	11 (15.9)	28 (23.1)	39
RPRcomp	7 (6.1)	8 (8.9)	15
Limitation	0 (0.4)	1 (0.6)	1
Total	31	45	76
χ^2 = 7.337; 3 degrees of freedom; P = 0.062			
Numbers in brackets are expected values. SOR: statement of result; RPRcomp: reference to previous research for comparison.			

Table 4. Distribution of Move type in Discussions with initial background information in the two subcorpora

4.2 Discourse style

When the presence and the amount of background information was taken into account together with the Move type to establish the discourse style, a statistically significant difference was found between the English language discussions and the Spanish comparable texts (table 5). Whereas just over half (33/64; 52%) of the former displayed the retrogressive style, the overwhelming preference (54/64; 84%) in the Spanish subcorpus was for the progressive style (P < 0.001).

Discourse Style	English	Spanish	Total
Retrogressive	33 (21.5)	10 (21.5)	43
Progressive	31 (42.5)	54 (42.5)	85
Total	64	64	128
χ^2 = 16.950; 1 degree of freedom; P < 0.001			
Numbers in brackets are expected values.			

Table 5. Relationship of discourse style with the language used for publication in the two subcorpora

4.3 Non-native writers

The compilation of the original English language subcorpus was based on the random selection of eight research articles with the required IMRAD format for each of the eight journals, and no further selection criteria had to be met. As a result, the authors of the studies included in the corpus could be either native language writers or authors whose mother tongue could well be a language other than English. The application of the identification criteria for the latter yielded a total of 22 authors considered most likely to be non-native writers of English publishing in English language journals. The range of countries of origin was broad: Sweden 5; France 3; Austria, Denmark, Germany and Holland 2 each; Belgium, Israel, Japan, Norway, Spain and Switzerland one each. The number of non-native writers varied per journal. The selection of articles included at least one non-native writer for all the journals, but in the case of the journal *Acta Obstetricia et Gynecologica Scandinavica*, all eight of the selected articles were written by non-native authors.

Comparison of native and non-native writers (table 6) showed no significant difference with regard to the retrogressive and progressive discourse styles ($P = 0.657$), indicating that non-native writers either share or successfully adopt the appropriate discourse style in these specialised publications.

Style	Native	Non-native	Total
Retrogressive	23 (21.7)	10 (11.3)	33
Progressive	19 (20.3)	12 (10.7)	31
Total	42	22	64
$\chi^2 = 0.197$; 1 degree of freedom; $P = 0.657$			
Numbers in brackets are expected values			

Table 6. Comparison of native and non-native writers in terms of discourse style

When the non-native writers were compared to the Spanish authors (table 7), a significant difference was observed in the discourse styles used ($P = 0.010$).

Style	Spanish	Non-native	Total
Retrogressive	10 (14.9)	10 (5.1)	20
Progressive	54 (49.1)	12 (16.9)	66
Total	64	22	86
$\chi^2 = 6.577$; 1 degree of freedom; $P = 0.010$			

Table 7. Comparison of Spanish authors and non-native writers of English language articles

4.4 Study type

For the analysis of the influence of study type on discourse style in the two subcorpora, studies were divided into six broad groups taking into consideration as far as possible the strength of the evidence afforded by the study design. The groups established were trials, experimental and investigational studies, epidemiological studies, large prospective series, large retrospective series, and small series (< 30 subjects). The distribution of the discourse styles in relation to study type is shown in table 8.

Study Type	English			Spanish		
	Total	Retro	Prog	Total	Retro	Prog
Trials	18 (11)	12	6	4 (11)	2	2
Experimental/investigational	5 (4.5)	2	3	4 (4.5)	2	2
Epidemiological	7 (6.5)	2	5	6 (6.5)	0	6
Large Prospective Series	17 (16.5)	9	8	16 (16.5)	1	15
Large Retrospective Series	9 (14)	4	5	19 (14)	3	16
Small series	8 (11)	4	4	14 (11)	2	13
Total	64	33	31	64	10	54
$\chi^2 = 14.829$; 5 degrees of freedom; $P = 0.011$						
Numbers in brackets are expected values; Retro: retrogressive style; Prog: progressive style						

Table 8. Discourse style in the two subcorpora according to study type

The distribution of study types between the English language and Spanish subcorpora showed a statistically significant difference ($P = 0.011$). In comparison with the English subcorpus, the Spanish studies had a considerable deficit of trials and exhibited smaller excesses of both large retrospective studies and small case series. Owing to the small numbers in many of the individual categories, no formal statistical analysis was performed between styles for the language of publication. Nevertheless, differences are evident from the figures. Two thirds of the trials in the English language subcorpus displayed the retrogressive style whereas only two of the four Spanish studies denominated trials had retrogressive discussions. Although the epidemiological category covers a number of study types with this orientation, it is noteworthy that two English language discussions in this category exhibited a retrogressive style whereas all six Spanish studies displayed the progressive style. In the remaining four study categories, the progressive and retrogressive discourse styles were fairly evenly distributed in the English subcorpus; in contrast, in the Spanish subcorpus, this was true only for the experimental and investigational studies. For small case series and for large series, whether retrospective or prospective in nature, the style of the Spanish discussions was overwhelmingly progressive.

5. Qualitative analysis

5.1 Initial background information

The quantitative analysis showed that significantly more Spanish studies than English language studies opened the discussion section with background information (45 versus 31, respectively). Moreover, our previous study (Williams, 2009) found that overall the Spanish discussions also contained a significantly greater amount of background information (median 14.3% versus 0%); however, when only those texts with background information were considered, the difference was no longer statistically significant (median 24.0% versus 15.8%). This study examined the type of information included as background and again no difference between the subcorpora was found. Of the 45 Spanish discussions with background content, 28 (62%) included only external information, that is, general context and a general or specific review of previous research; 14 (31%) combined external data with details of the current study in the form of a restatement of aims and/or description of selection criteria or methods; and 3 (7%) presented contextual information on the current study only. The corresponding figures for the 31 English language discussions were 18 (58%), 9 (29%), and 4 (13%), respectively.

The following extract (sample text 2) is a typical example taken from the Spanish subcorpus (Note: all English translations from the Spanish subcorpus are mine) of a discussion with only external general content prior to the first statement arising from the current study, which in this case is a numerical result (S7). The background provided consists of three cycles, each in its own paragraph (marked by the symbol #): a definition of granulocyte elastase (S1); its mode of action and the usefulness of Elastase α_1-Proteinase-Inhibitor complex as a biochemical marker (S2-4); and the positive and negative characteristics of the behaviour of free elastase (S5-6). All the background information consists of type 3 and type 4 statements (Latour &Woolgar, 1979).

#S1	# Granulocyte elastase is a glycoprotein with a molecular weight of 30 kD, which is located in the azurophilic granules of polymorphonuclear leukocytes, which contain 3 µg of elastase/10^{-6} cells (11).
#S2	# In the presence of an inflammatory and/or infectious process, the granulocyte elastase released by neutrophils immediately binds to $\alpha1$-antitrypsin and $\alpha2$-macroglobulin in a proportion of 90% and 10%, respectively, and they inactivate it in thousandths of a second.
S3	When the local concentration of the elastase exceeds that of $\alpha1$-antitrypsin and $\alpha2$-macroglobulin, it acts on a series of biological substrates and increases the inflammatory response.
S4	Therefore, the determination of E-$\alpha1$-PI complex in blood is a biochemical marker of the inflammatory response in tissues (12).
#S5	# Free elastase performs two types of action: one beneficial by destroying toxins, attacking infectious agents and removing cell debris; and the other harmful by inactivating functional proteins, producing toxic peptides and damaging intact tissues.
S6	Its proteolytic activity also influences different blood systems, such as coagulation, fibrinolysis and the complement cascade (11,12).
#S7	# In this study, the reference values for E-$\alpha1$-PI complex (median, range) obtained in the plasma of 99 healthy newborns were 189 µg/L (46-196 µg/L).

Sample text 2. External background information in a progressive style Spanish Discussion

An example of a discussion with less background but including not only general contextual information but also details on the current study design is taken from an English cancer trial (sample text 3). Despite the relatively high frequency of pancreatic carcinoma, it presents considerable difficulties for study design and implementation. The authors move rapidly from the general context (S1) through previous studies (S2) to certain aspects of their own design (S3) before stating their first result (S4). The following comparison with previous research (S5), together with the earlier citations, justifies the seemingly low recruitment rate and places the study in a better light. It should be noted that this study was one of the minority of six trials that exhibited the progressive discourse style, and one of the reasons for this choice may have been the poor recruitment rate, which could place the validity of the results in doubt.

As in this example, all the English language discussions which combined general context with specific details on the current study explicitly mentioned at some point the rationale underlying the aim, design, patient selection or a procedure (table 9).

#S1	# Carcinoma of the pancreas is a common condition in the UK (approximately 100 cases per million population annually).
S2	Trials of treatment have often included relatively few patients.[6-8]
S3	This trial was designed to minimize disruption to patient and participating clinician, with the coordinator performing all administrative and clinical duties.
S4	Only 44 patients were randomized during the 2 years of the trial despite 102 patient referrals.
S5	The recruitment rate (43%) was not unusually low for a clinical trial of this type.[16]

Sample text 3. Mixed external and internal background information in a progressive style English language Discussion

1	This study evaluated the relationship between bile duct diameter and the risk of developing an immediate complication of ES [endoscopic sphincterotomy]. Sphincterotomy may be more hazardous in patients with a duct that is not dilated or tapered distally (6), particularly if performed for dysfunction of the sphincter of Oddi (7).
2	In addition, we used Doppler color flow imaging to determine the origin and direction of the mitral regurgitant jet. Use of color jet direction reflects the physiology of the "nozzle" of the regurgitant orifice, which augments anatomic information available from two-dimensional echocardiography alone.
3	Since describing the autologous GvHR [graft versus host reaction] and the ELR [eruption of lymphocyte recovery], we have been interested in the apparent similarities between these entities. [...] We were interested to determine whether histologic changes developing in skin affected with autologous GvHR and ELR were consistently different or whether there was sufficient overlap in findings to make distinction difficult or impossible.
4	In the present study, women born 1923, 1929, 1931 or 1933 were chosen since they had previously not been interviewed about their climactic symptoms.
5	Asymmetric patients with primary open angle glaucoma were selected because of the high probability that the perimetrically normal eye would eventually develop a visual field defect, so that temporal relationships between disc and field damage could readily be established.
6	In an attempt to clarify the pathogenesis as well as the definitions used in this report, we elected to exclude cases of pneumonia and suspected pneumonia. The difficulty of diagnosing pneumonia with certainty has been noted by others (18).
7	The goal of this survey was to identify features of staffing patterns, ancillary services, patient follow-up, and clinical issues common to a variety of institutions providing emergency care for children. Through such data collection it is hoped that standards for patient care, teaching, and research can be developed.
8	Complications of noncontact diode cyclophotocoagulation have been few and have included mild uveitis and conjunctival burns that cleared rapidly with topical prednisolone acetate. Several patients have been noted to lose visual acuity, but no other significant complications have been reported (1,6-8). In this study we evaluated patients who underwent noncontact semiconductor diode transscleral cyclophotocoagulation with follow-up for up to 1 year, to evaluate intraocular pressure control, prognostic factors, and complications.

Table 9. Exponents of the expression of the rationale behind study design and methodological choices in the background information of English language Discussions

The variation of expression is great, ranging from the selection of the object of study (1) supported by a hypothesis, and a reasoned choice of procedure (2), through a change of viewpoint in approaching a problem (3), choice of subjects (4 and 5), and justification for patient exclusion (6), to the establishing of aims in the face of novel situations (7 and 8) – namely, development of a new field (paediatric emergency medicine) and application of new technology.

In the 14 Spanish discussions with combined background information, explicit rationale was not always present. In one study, the specific context was limited to a description of the rural location of the hospital. Other studies included repetitions of information provided in other sections: in one case, the justification for the study as in the introduction section but in more detail; in another, the inclusion criteria; and in a third, the description of the age- and sex-matched control group. However, the remaining discussions largely coincided with their English language counterparts. Two studies involving novelty merit special attention since the true comment on the results was delayed almost to the end of the section. The first of these involved the experimental application of a drug by a new route in five patients with Aids-related cytomegalovirus (CMV) retinitis. The authors meticulously examined the problems of treatment with a review of the relevant literature, and proposed four potential advantages of intravitreal foscarnet over the alternative treatment with intravitreal ganciclovir. All of these data (85% of the discussion) motivated the current study (sample text 4).

#S1	# These data led us to carry out intravitreal treatment with 0.1 mL of foscarnet 2,400 microgram solution twice weekly for induction and once a week for maintenance, since the pharmacokinetic data obtained provide a safety margin for these intervals.
#S2	**Conclusion** # The complete response in all patients after intravitreal administration of 0.1 mL of 2.4mg foscarnet opens up a new therapeutic possibility in the treatment of CMV retinitis, and offers a broader therapeutic range so that treatment can be varied according to the response of the disease to the drugs and routes used at any given time.
S3	We recommend the 2.4 mg/0.1 mL dose, which shows no toxicity at the same induction and maintenance frequency as ganciclovir.
S4	Nevertheless, there is a need for a broader clinical study for a comparison with the results obtained by other authors in order to establish the viability of making this treatment a daily reality.

Sample text 4. Late claim in a progressive style Spanish Discussion

The rest of the section consists of a description of the treatment and the underlying rationale (S1), followed by a subsection labelled 'Conclusion' consisting of a claim (S2) for this approach based on the result, which is embedded in the grammatical subject and not expressed in an independent statement, and two recommendations, one for clinical practice (S3) and the other for further research (S4). Although the background information is followed by a claim, the style is progressive, but the authors clearly felt there was no need for further comment on the results.

The studies (4 English and 3 Spanish) in which the background information deals only with the current study are characterised by a very short introduction of two sentences on average (range 1 to 3). In three of the English language discussions, this background was followed by a claim initiating a retrogressive section; the other study had a finding. In contrast, two of the three Spanish studies had statements of results after the background and the other a

limitation. Table 10 shows an example of each of the three moves following methodologically oriented contextualisation: 1) numerical result; 2) claim; 3) limitation. In example 1, the choice of the cut-off for definition of adolescent mothers is supported by the rationale, and the ensuing numerical result is compared to previous research. Example 2 restates the aim of the study, which is to compare the argon green laser (AGL) and the krypton red laser (KRL), and this is immediately followed by a claim that answers the study question but the implications of which extend beyond the limits of the current study. In example 3, the theoretical assumptions and precisions of the opening statement require an immediate precautionary statement to avoid the risk of an exaggerated or over-optimistic interpretation of the results, and this is manifested as a limitation. These two sentences form the opening paragraph of the discussion, which is followed by a list of the assumptions that have been made before the results are presented and commented on; this discussion, therefore, displays the progressive discourse style in spite of the claim-like character of the limitation.

1	Our study population included pregnant women 18 years of age or under and although not all authors agree on this age (5,7,8,9), it is based on the fact that in Spain the age of majority is reached at 18 years, a point after which ethical and socioeconomic factors play a significant role. There were 4.08 deliveries in adolescent women with an annual maximum of 4.43% and an annual minimum of 3.55%, figures somewhat higher than those of previous studies (7,9).
2	This clinical trial was designed to determine if either AGL or KRL is superior to the other by one line of visual acuity. This study rejects the hypothesis that KRL is superior by 1 line of acuity (5% probability of error).
3	For calculation of the estimations presented here certain assumptions and precisions have been made concerning the data, methods and objectives used. For this reason, the results presented only claim to be illustrative of the theoretical benefit that could be achieved by preventive intervention.

Table 10. Move types following background information on design and methodological issues

5.2 Studies with no background information

As observed in the quantitative analysis, the English language subcorpus contained many more studies with no background information move than the Spanish comparable subcorpus (33 and 19, respectively). Twenty-two of the English discussions opened with a claim. The main exponents, or phraseological patterns, of these claims are summarised in table 11. The exponents listed in rows 1 to 6 share some features but differ in at least one aspect. They all contain instances of epistemic verbs, which can be roughly graded from strongest to weakest: *demonstrate, show, confirm, provide evidence, indicate*, the choice of which is essentially strategic as writers adjust the strength of their claim to their confidence in its truth value (Hunston, 1994; Hyland, 1998). The variation in choice of tense should also be noted: the present tense expresses the greatest generality and the simple past the greatest specificity, with the perfect tense occupying an intermediate position. The distinctive aspects for each case are that in (1) the presence of the authors through the pronoun *we* indicates that the writers assume responsibility for the claim, freeing the reader to decide whether to accept or challenge it in what Hyland (1998) has identified as a reader-oriented hedge. In (2) and (3) the researchers place the responsibility on the study as a whole or on the data obtained, respectively. In (4) the reported clause is replaced by a noun as the direct

object of the verb. This brings the claim closer to a statement of finding; note that the presence of the phrase *for the first time* stakes a claim for originality, and the *different patterns* mentioned in the other instance generalises the individual findings reported in the results section. In (5) the authors have shifted the perspective to have the object of study (*photodynamic therapy*) or an aspect thereof (*benefits of endoscopic surgery*) as the point of departure for the claim, which means use of the agentless passive to maintain "anonymity". In (6) the more usual introductory reporting clause (examples 1-3) is replaced with a subordinate clause, which achieves a similar effect. The remaining instances are of a different character and the last one is a highly personal choice. In (7), the epistemic verb is replaced by *support* and the authors' claim is for the originality of their findings. In (8) it is the presence of the evaluative element *most striking* and *most important* that confers the status of claim on the finding. The same effect is achieved by the evaluative adverb *clearly* in example (9), thus validating the adequacy of the *in vivo* model employed in the study. The final example shows a different writer strategy; the statement displays the form of a counterstatement to anticipated potential criticisms of the study related to selection bias or faulty or irreproducible methodology. Having defended their study with this rather weak claim, the authors proceed to make a stronger claim: "Differences are explained by the different treatments given to the two subgroups of IDA [iron-deficient anaemic] infants".

1	We have shown that ... In this study we provide evidence that ...
2	The current study demonstrates that ... This study demonstrated that ... This study shows that ... This study has shown that ... (2 instances) The present study showed that ... Our trial indicates that ... This trial provides good evidence that ...
3	These results demonstrate that ... The overall results of this trial show that ...
4	This study shows for the first time a reduction ... The study showed different patterns of risk ...
5	In this study, PDT has been shown to be an effective therapeutic modality... The benefits of endoscopic surgery were clearly shown in this study.
6	As confirmed by our study, restenosis after successful coronary angioplasty is not necessarily associated with recurrence of angina ...
7	The data presented support the following three new concepts: ...
8	The most striking finding in this study is the strong relation between ... The most important finding in this study is that ...
9	Interleukin 6 clearly stimulated epithelial wound closure in this simple corneal abrasion model *in vivo*.
10	The randomised blinded design used in this study makes it unlikely that the significant differences between iron and placebo treated infants in changes in mental and motor development scores could depend on errors associated with subject selection or with the administration and nature of the Bayley scales.

Table 11. Exponents of initial claims in the English language Discussion sections

In contrast to this wide range of opening claims, the Spanish subcorpus only contained six instances of initial claims. Of these only one coincided with the formulas observed in the English language discussions by opening with "The results of this study show that". The other five displayed minor variations or were radically different (table 12).

1	The results found in our study population suggest that the activity of itraconazole is similar to that of griseofulvin in the treatment of Tinea manuum and Tinea pedis.
2	According to the results obtained, the three antioxidant agents used in the present study produce a statistically significant reduction in the corneal chemiluminescence values in comparison with the control group both in the study using incubation *in vitro*, with highly significant differences (p <0.001) for all three agents, and after treatment *in vivo*, with significant differences (p <0.05) for the group treated with SOD [superoxide dismutase] and highly significant differences (p <0.001) for the groups treated with DMTU [dimethylthiourea] and bendazac lysine salt.
3	Our results confirm the antiproliferative effectiveness of the different drugs under study although there are differences in the concentrations used.
4	Since the source of the three samples in case 1 is known (amniotic, cystic and ascitic), the values obtained will serve as a reference in the comparison with cases 2 and 3, which although thought to come from the amniotic fluid, must have resulted from the accidental puncture of the hygroma.
5	The absence of Schlemm's canal is thought to be one of the factors that lead to increased intraocular pressure and is considered by some authors to be the main determinant of congenital glaucoma; it cannot, however, be a primary cause, since this structure has been identified in many other cases with high intraocular pressure, as has also been seen in this study.

Table 12. Exponents of initial claims in the Spanish Discussion sections

The variation in (1) lies in the use of *suggest*, which is even weaker than *indicate* on the epistemic scale presented above. Example (2) introduces an alternative to the epistemic verb in the form of the prepositional phrase "According to the results obtained" placed before the claim, which is further supported by the statistical evidence; a more natural translation would use formula 3 of table 10. Example (3) shows that the verb *confirm* can be used for claims in association with evaluative concepts such as efficacy and safety in relation to drug testing. However, the last two complex examples require more detailed explanation. The study from which claim (4) is taken is a series of just five cases and seeks to establish a reliable way of distinguishing between different fluid samples in cases of 45,X monosomy obtained during pregnancy. The opening statement in the discussion contains two claims, both of which are prefaced by background in the form of subordinate clauses. Given the limited evidence, the claims are virtually restricted to the bounds of the study, but the first could establish valid reference values for other cases of the condition. Example (5) has a highly complex structure, and is a non-literal translation of the Spanish sentence that uses a device not available in English. As a result, the English states in two sentences what the Spanish does in one, the first containing background information and the second the claim, but as in the original the claim is stated at the end in the subordinate clause "as has also been seen in this study". It is also the weakest claim of all because of this final position. What the authors are claiming is that "This study has shown that the absence of Schlemm's canal cannot be a primary cause of congenital glaucoma"; however, owing to the state of knowledge at that time and in order to avoid open conflict with other authors, the claim has been so attenuated that it hardly merits the name.

5.3 Studies with background information

In the discussions in which background information was followed by a claim, the formulas used were basically similar, but some differences could be discerned (table 13). In comparison to table 11, there are no instances of a first person epistemic verb, but in (1) the claim is linked to the authors through the possessive *Our study* and is strengthened with the adverb *clearly*. In contrast, in the two claims starting with *results*, the subject is combined with the weaker epistemic verbs *indicate* and *suggest*, the former again boosted by *clearly*, but the use of *suggest* might make readers wonder how confident the authors are about their study; however, it does not stand out so much as the instance in the Spanish discussion. Example 3 combines an epistemic verb with an evaluation *better results* in a study in which the authors were defending the much maligned Angelchik device for treatment of gastric reflux. Example (6) is a good instance of anthropomorphic metonymy (Williams, 2005; Williams, 2008) in which the research replaces the researchers but retains their cognitive abilities to *reject the hypothesis* under consideration. Examples 5 to 7 make claims for originality, interest and merit. The first two are clearly introductory claims that structure the discourse and lead on to a series of aspects for comment and interpretation. The importance of the third claim is justified by the risk of malignancy so that an accurate diagnosis is essential. Examples 8 and 9 are illustrations of weaker or tentative claims that require contextualisation because they could hardly stand at the head of the discussion section. Examples 10 and 11 are late claims preceded by so much general discussion that they constitute conclusions. The study in which the first of these claims appears is a review of six small series on the development of a specific clinical entity, *de novo* detrusor instability, following surgery. The aim is to identify predictive factors. Since the results are mostly negative, no major claim can be made and the progressive style is appropriate. The second study presented a novel surgical technique and is similar to the two Spanish studies described above. The authors discuss the advantages and disadvantages of the alternative approaches and conclude that the new technique is successful in overcoming most, if not all, of them.

All discussions in which the first statement arising from the current results is a result, a finding or an unexpected outcome exhibit the progressive discourse style, whether they include prior background or not. However, analysis of the discussions with and without contextualising background revealed qualitative differences that could be confirmed in a larger corpus. In the English language discussions, eight of the ten texts had one of the more general statements of finding – expressing a comparison, a relationship, or a general observation – and only two opened with a numerical result. In the discussions with initial background information, a trend was evident towards a greater presence of numerical results (5 of 11, 45% of the texts). In the Spanish subcorpus, two of the seven discussions with no background opened with numerical results, and one of them opened with a statement classed as an unexpected outcome. "*Lo primero que nos ha llamado la atención es la baja prevalencia de portadores en nuestra población*"; 'The first thing that has drawn our attention is the low prevalence of carriers in our population'. Although classed as an unexpected outcome, it comes close to the evaluative claim formula of "The most striking result of our study is ..." (table 11). In the discussions with initial contextual background, the numerical results accounted for 18 of the 28 (64%) studies, considerably higher than in the equivalent English language studies.

Similarly, all discussions opening with a comparison with previous research, with or without background information, exhibit the progressive style. However, no English language discussion had this Move as its initial sentence whereas five of the 19 Spanish discussions with no initial background did so (table 14).

1	Our study shows quite clearly that ... This study showed that ...
2	The results of this subgroup analysis clearly indicate that ... The results of this study suggest that midazolam is effective in providing rapid sedation and reduction in anxiety in preschool children during laceration repair.
3	The results of the present trial after 4-6 years of follow-up continue to show marginally better results with the Angelchik device.
4	This study rejects the hypothesis that KRL [krypton red laser] is superior by 1 line of acuity (5% probability of error).
5	Our series of pemphigus foliaceus presents original epidemiologic peculiarities.
6	In our work, the comparison of the two SCC [squamous cell carcinoma] groups revealed some interesting features.
7	Histologically, DPN [deep penetrating nevus] is worth recognition as in approximately 30% of the cases the possibility of malignant melanoma was raised.
8	That thyroid orbitopathy is primarily a disease occurring most often in women is not surprising, as thyroidal Graves' disease also preferentially affects women.
9	For women in Dundee having a termination of pregnancy the non-participation rate of only 3.4% and the exceptionally high proportion (93.2%) opting for an anonymous test might be attributable to the special circumstances of the termination of pregnancy patient compared with the antenatal clinic attender.
10	Only one study has shown that multiple previous operations seems to be a risk factor (9).
11	With our technique, the removal of the posterior lens capsule under positive pressure and in closed-system conditions is highly controlled, and the desired ICCE-like [intracapsular cataract extraction] state is obtained without loss of silicone.

Table 13. Exponents of claims that follow initial background information in the English language Discussion sections

1	Our findings confirm those of previous reports by Sale *et al.* (2), Elliot *et al.* (3), Sviland *et al.* (4) and Lever *et al.* (6) on the presence of necrotic keratinocytes in the normal skin of autologous and allogeneic bone marrow transplant recipients both before and after the conditioning regimen.
2	These results are consistent with those obtained by Diamond and Kaplan (5), who found improvement in visual acuity in 24 of 25 cases of chronic uveitis treated with vitrectomy, with fewer recurrences in the treated group compared with non-treated patients.
3	In our study the survival rate of 98% was slightly higher than that reported in most studies (1-5), even though there were 19 cases of shock (38%), 6 cases of shock with diffuse intravascular coagulopathy (12%) and two cases of acute respiratory failure (4%).
4	The prevalence of iron deficiency of 4.94% found in our study population is higher than that reported in other studies: 3.27% in the group studied by Martin in 1989 in a rural population in Tenerife between four and sixteen years of age (1).
5	The high prevalence of hepatitis B virus infection observed in this study (78%) is not substantially different from that reported in previous studies, in which the prevalence of positive markers in intravenous drug users was between 75% and 85% (7-9), with anti-HBc as the commonest marker.

Table 14. Examples of initial comparisons with previous research in Spanish Discussions

It should be noted that in these section-initial comparisons, two patterns are apparent: the general noun *findings* or *results* refers to the whole of the previous results section (examples 1 and 2), or a numerical result is embedded in a complex expression of the grammatical subject (examples 3-5).

1	The proportion of cases with objective confirmation of the initial diagnosis was not as high in those studies as in our trial.
2	The data obtained in such studies agree well with the 6.5% BZD [benzodiazepine] use found among the 46 controls in this study with a combined review of maternity health records and biochemical screening during early pregnancy.
3	As in other biochemical markers, individual differences were noted in the preoperative serum β-endorphin concentrations as well as the β-endorphin response to the circumcision procedure.
4	Although our patient group was basically similar, our results contradict these findings.
5	Symptoms and clinical findings of our patients are in accordance with reports in the literature.
6	The response rate in the present study, 76%, is well in line with our own study of 60 to 62 year old women (6) and also with other, similarly performed cross-sectional studies (11,12).
7	The rate of rim-area loss of 2.1%/y in eyes with an initial field defect and 1.7%/y in the contralateral eye is comparable with the rate recently shown by Airaksinen *et al* (25).

Table 15. Instances of comparison with previous research in English language discussions with background information

Table 15 shows the instances from the English subcorpus of the comparison with previous research Move that initiates the discussion after the initial contextual information. In these comparisons the movement is both inward from the previous research to the current study (examples 1-3) and outward from the current findings to other researchers' studies (examples 4-7). In tables 14 and 15 taken together, in addition to the characteristic comparative structures *higher than* and *(not) as high as*, other exponents include *in line with, comparable with, in accordance with, consistent with*, and the verbs *confirm* and *contradict.*

A minority choice, both in the English and Spanish discussions with zero background was to open the discussion with a limitation (table 16).

1	The number of foetal heart rate patterns included in this study does not allow analysis of the agreement between the description and evaluation of these patterns and the foetal outcome, as such a correlation would be entirely dependent on the selection of the 11 cases.
2	The data obtained in the present study are not representative of the general reference population taking digoxin, since patients came from a hospital emergency department. They are only representative of a population with heart disease in a phase of decompensation.

Table 16. Instances of limitations that open the Discussion section in the English language and Spanish subcorpora

Although the limitation in (1) is a reflection of the selection of the patterns included in the study and as such a methodological question, it is also a comment on the results obtained for the two aspects, which cannot be correlated and are, therefore, presented separately. In the case of the Spanish discussion (example 2), the limitation of the representativeness of the sample, which is presented as a warning to the reader, is immediately followed by an attenuated claim that the sample does represent the population for which it was intended, that is, patients attended in the emergency department for sudden worsening of their heart condition. This text was finally classified as portraying the retrogressive style.

In the light of the qualitative analysis of the results of the comparison of the English language and Spanish discussions, the following tentative conclusions can be reached. There are clearly differences in the choices made by authors publishing their research in the two languages. The retrogressive discourse style is far more prevalent in English language publications than among Spanish writers publishing their work in their national journals. The number of Spanish studies with background information was higher than in the English subcorpus and the amount included tended to be greater. However, the presence of background information is indicative of, but not exclusive to, the progressive style. In the qualitative assessment, the main difference between the subcorpora was that English language Discussions generally provided the underlying rationale when describing specific points of methodology, both when this information was combined with general contextualisation and when it appeared alone as background. In relation to the retrogressive style, the English language texts displayed a wide range of exponents of the opening claim (Move 7). They varied from standard formulas to individual personalised expressions of this Move, and also showed considerable variation in the strength of the expression, which allows writers to convey the level of commitment to the claim and the degree of certainty. In contrast, the small number of initial claims in the Spanish subcorpus inclined to the lower end of the scale, with weaker lexical verbs and greater uncertainty. Despite a degree of overlap with the English language Discussions, the great majority of the Spanish texts conformed to the progressive style. Whether cultural differences are the only explanation of this will be examined in the following sections.

5.4 Native and non-native writers of English

The quantitative analysis comparing native with non-native writers within the English language subcorpus showed no differences in the choice of the progressive and retrogressive discourse styles ($P = 0.657$). Further analyses of these subsets with regard to use of background information and selection of opening move largely confirmed the overall result. Thus, exactly half (11 of 22 authors) included some initial background compared to 48% (20 of 42) of the native authors. However, native authors were more likely to include background information on the current study, either combined with external context or exclusively (10 of 19 authors, 53%), compared with 3 of 12 non-native writers (25%). As regards the choice of Move to open the commentary, both native and non-native writers predominantly selected a claim (55% in both cases) although two non-native discussions presented late claims and corresponded to the progressive discourse style. However, in the native discussions the statement of result or finding was a clear second choice (16 of 42, 38%), with the comparison with previous research showing only a token presence (3 instances, 7%). In contrast, results/ findings and comparisons were fairly even in the non-native discussions (5 and 4 instances, or 23% and 18%), and there was one opening limitation (see table 16).

These results indicate that non-native writers publishing in the selected journals successfully adapt their discussions to the required discourse style, although from a textual study like

this it is not possible to know how the final text was arrived at, what strategies were employed, whether translation or native-speaker editing was used, or what negotiation was required with the referees and editors of the journals.

5.5 Study type and discourse style

For our analysis, the study types were broadly grouped according the strength of the evidence they can be expected to produce according to the design. The studies producing the strongest empirical evidence can be expected to correlate with the retrospective discourse style in which the main claim either opens or is placed fairly close to the start of the Discussion, and alternatively the studies with the weakest design, that is, those most prone to problems such as missing data, selection bias and confounding factors, will probably correlate with the prospective discourse style, since in these circumstances writers will be less likely to be able to make a strong claim for their research and, therefore, will build an argument carefully from initial premises, through relevant data before venturing to make interpretative or speculative statements. The quantitative data largely support this hypothesis, although there are differences between the two subcorpora. In the English language subcorpus, two thirds of the trials have retrogressive discussions, and the studies with weaker designs tend toward equality between the retrogressive and progressive styles. In the Spanish subcorpus, the studies with the strongest design are equally distributed between the discourse styles, but the epidemiological studies and case series strongly favour the progressive style. In what follows, we shall attempt to account for some of the anomalous cases.

Of the six trials in the English language subcorpus that used the progressive style, two were follow-up studies in which *post hoc* subgroup analyses were performed. In these cases, since the object of the new study was not a primary outcome of the original trial, the relevant data may not have been collected with the necessary rigour and will be prone to the problems of bias and confounding factors. Sample text 5 is the opening of the Discussion of one of these trials. It begins with a series of findings (S1-S4), followed by comparison with previous studies (S5) before the authors make their claim for originality (S6-S7).

#S1	# The principal findings of this study are that Holter monitoring detected ST segment depression after acute myocardial infarction in 32% of patients.
S2	This incidence was unrelated to the use of thrombolytic therapy.
S3	Patients with ST depression had more severe stenosis in the infarct-related artery, greater left ventricular dysfunction and a more unfavorable prognosis.
S4	The occurrence of ST depression on Holter monitoring was more closely related to the severity of residual stenosis in the infarct-related artery and to the incidence of cardiac events during follow-up than was the occurrence of ST segment depression during exercise testing.
#S5	# Our findings support the previously reported prognostic significance of ST segment depression after myocardial infarction (1,2,5).
S6	The novel contribution of our study is the identification of a possible pathophysiologic mechanism linking the occurrence of ST depression and unfavorable prognosis.
S7	Our study is the first to establish the association between the occurrence of ST segment depression after myocardial infarction and the severity of lumen narrowing in the infarct-related artery.

Sample text 5. Trial with a Discussion displaying the progressive discourse style

In a third trial (see sample text 2) the progressive style was the suitable choice not only because of the small numbers of patients enrolled, but because the overall result was negative. Another trial comparing short-term (4 weeks) and long-term (3 months) anticoagulation for deep vein thrombosis and pulmonary embolism yielded mixed results slightly favouring the long-term treatment overall, but indicating short-term anticoagulation when the thrombosis or embolism developed postoperatively. However, the authors' claim is only tentative and they are careful to warn that this result was based on a *post hoc* analysis: "Our finding of only 1 failure to resolve and 1 recurrence among 60 patients whose DVT or PE developed postoperatively suggests that 4 weeks' treatment may be sufficient for such patients. This conclusion, however, is based on a post-hoc analysis and should be confirmed by a further prospective study solely of postoperative patients." When the claims are only tentative, the progressive style becomes the more likely choice. In a trial of topical anaesthesia with lidocaine cream for the circumcision of newborns, the main claim did not appear until the last sentence of the Discussion: "In summary, under these experimental conditions, this study has demonstrated that a topical 30% lidocaine cream applied prior to circumcision of the term newborn may be a safe and efficacious anesthetic." Despite the strength of the evidential verb *demonstrate*, the authors can only claim that this approach *may be* safe. This uncertainty could well have conditioned their whole discourse strategy in the Discussion and led to the choice of the progressive style. The final trial exhibiting the progressive style is more difficult to account for. The trial was a large multicentre, multinational, double-blind, randomised, placebo-controlled study in acute myocardial infarction with ramipril as the study drug. The Discussion was also one of the longest in the subcorpus. Unlike the previous studies, this trial produced positive results, and yet the authors only went as far as restating the main finding at the head of the section: "Ramipril, administered to patients with clinical evidence of heart failure on the second to ninth day after myocardial infarction for an average of 15 months, caused a highly significant and substantial reduction in all-cause mortality." This is an objective past-tense statement of a time-related change produced by the effect of treatment. There is no boosting (*demonstrate, show*) or attenuation (*suggest*) through evidential verbs, and the strength of the assertion relies wholly on the statistical analysis and the size of the change (Skelton, 1994). It could be that in such a large trial with multiple authorship no agreement could be reached on a stronger claim for the results of the study.

In the Spanish subcorpus, two trials exhibited the retrogressive style although the claim in one was attenuated by the use of *suggest* (see table 12). Of the two trials with the progressive discourse style, one was an open-label trial and the patients were not randomised. This weakening of the study design may have been enough to lead the authors to employ a considerable amount of background, both external and methodological, before making a late claim (after 70% background information) for their study: "The results of our study show that the effectiveness of the two antimicrobial agents is similar with regard to the therapeutic action of eliminating the microorganism, around 92%, and eradication of Chlamydia was maintained until the follow-up visit one month later, a period that is similar to that reported in most studies (17,18)." Note that the claim for effectiveness is supported by a finding and comparison with previous research. In the second case, the Spanish study formed part of a multinational European trial comparing active and passive approaches to the management of labour with the ultimate aim of reducing the caesarean rate. The results were again non-conclusive: "In view of our results and those from the rest of the European

Study, it is difficult to make a definitive pronouncement on one or other of the strategies, since no differences were found for the number of operative deliveries and specifically for caesarean sections."

The experimental and investigational studies covered a variety of designs and were placed together in one category for the convenience of statistical analysis. Nevertheless, the two discourse designs were evenly distributed in the two subcorpora. All the experimental studies with a comparative design with objective quantitative measurement systems showed the retrogressive style, with the exception of a study carried out on the ability of nurses and parents to administer small doses of insulin to paediatric diabetic patients. In this study, the results of the initial measurements were negative in that all the subjects administered doses far in excess of the target dose, and so a second test was performed in which the standard was changed. The Discussion opens by reporting the negative findings of the original design: "Although the administration of low doses of concentrated insulin is common practice in pediatric care facilities, our study revealed a remarkably high error when doses of less than 2.0 U of U100 insulin are dispensed by skilled pediatric nurses. Attempts to deliver doses as low as 0.5 U or 1.0 U resulted in overdosage of 95% and 66%, respectively." Here, after the introductory background in the subclause, the initial finding is presented and this is supported by the numerical result. In this case the finding does not fall far short of classification as a claim. The more general claims for the study were expressed in the conclusion with a strong personal commitment: "We thus believe that the errors reported in this study are a conservative estimate of those that occur in day-to-day administration. We conclude that, until better measuring devices are available, it is impractical to deliver insulin injections of less than 20 μL (2 U of U100)." As seen with the trials, the negative results may be the reason for the choice of the progressive style.

Two Spanish experimental studies had the progressive style. One tested a novel modification to a surgical technique, and as seen in section 5.1, this can lead to choice of the progressive style since writers appear to feel the need for extensive contextual information on alternative procedures before making their claims for the new method. In this case, the authors went through the whole gamut of Moves before concluding with their claims: "From the results obtained, it can be deduced that the omega loop with Braun's anastomosis and an associated antireflux valve is a simple quick and safe technique which presents no risk of torsion or vascular compromise and is effective in preventing entero-hepatic reflux. For these reasons, we believe that this technique should be considered an option in diversion surgery for biliary problems in children." The opening formula (literal translation) for the claim is fairly frequent in Spanish and could be rendered more naturally in English as *The results of this study* + evidential verb; however, which verb to choose is not so clear: *show – indicate – suggest*. The claim is followed by a recommendation.

The second progressive style Spanish Discussion belonged to a study in which a new evaluation technique for surgical adhesions was applied in a rat model. The method was semi-quantitative and established the degree of severity for six surgical situations, and this may be the reason for the progressive style of the Discussion, which presents the findings in descending order and discusses the characteristics of the adhesions and the implications in each case. The first statement after the background context is: "Our method of adhesion

quantification revealed that the aetiological factor resulting in the most postoperative peritoneal adhesions is the presence of a foreign body."

The two studies investigating different aspects of clinical practice by means of questionnaires both displayed the progressive style. One opened with a limitation (see table 16, example 2) but, rather than making a counter claim directly, moved on to provide background information before presenting a finding. The second study aimed at collecting baseline data on the emerging new field of paediatric emergency medicine, mentioned in table 9 (example 7) in relation to background information providing the rationale for the study. Again the first statement arising from the data obtained was a finding. It would seem that this kind of investigation, which produces mainly descriptive quantitative data, lends itself to the progressive discourse style rather than the persuasive character of retrogressive argumentation.

Of the 13 studies classified as epidemiological, only two, both of which were in the English-language subcorpus, displayed the retrogressive style. One was a cohort study; studies of this type are ranked just below randomised clinical trials and higher than case-controlled studies and case series in terms of the quality and reliability of the data obtained, and this could justify a strong initial claim. However, another cohort study opened with the main finding followed by a general reference to previous research before the authors made a claim for the data they have produced which come to fill a gap in current knowledge: "The data presented define the overall and relative risks, although the small numbers of events have resulted in lack of precision with wide confidence intervals." The reason for the modest claim immediately becomes clear from the limitation of the statistical evidence so that the progressive style can be seen as the safer option for this study, in which only 334 patients were analysed in comparison to the 2,846 patients included in the cohort study with the retrogressive style.

The other epidemiological study had a tentative claim that followed some background information (see table 13, example 9). The study used pregnant women as a surrogate group to represent a heterosexual population at risk of contracting the HIV virus. The initial claim is not in fact the main claim for the study, but a claim concerning the quality of the data obtained, the main claim being placed later after more consideration of the study methodology. The authors' claim is that the study establishes baseline data that will serve in the future to measure rates of change in the prevalence of HIV infection. This study is, therefore, something of a hybrid between the two styles.

The main differences in the distribution of the discourse styles between the English language and the Spanish texts was seen in the case series whatever their characteristics, small series of fewer than 30 subjects, retrospective reviews of case notes or prospective studies. Overall, the two styles were evenly distributed in the English language texts but in the Spanish subcorpus there was only one retrogressive style Discussion for every seven progressive sections. To try to account for this discrepancy, we looked at how the research was presented in the Introduction section to see whether this had an influence on the choice of discourse style. In the prospective studies there was a trend for those that explicitly mentioned the testing of hypotheses or asked specific questions in the Introduction to provide answers to these questions in the form of an early claim in the Discussion: only one of six studies addressing this type of specific question had the progressive style. Sample text 6 illustrates this direct relationship in which the opening claims of the Discussion (S1-S3) reflect almost exactly the hypothesis stated in the Introduction (S0) for N-terminal natriuretic peptide (N-ANP).

#S0	# The current study tested the hypothesis that the concentration of N-ANP is raised and serves as a sensitive and specific marker in patients with symptomless left-ventricular dysfunction.
#S1	# The current study demonstrates that patients with proven ventricular dysfunction by radionuclide angiography and without symptoms of heart failure have raised concentration of plasma N-ANP.
S2	Our study also shows that this increased concentration is both sensitive and specific for ventricular dysfunction.
S3	These observations support a role for N-ANP as an important noninvasive marker for symptomless left-ventricular dysfunction.

Sample text 6. Discussion showing strong links between claims and the study aim stated in the Introduction

Other studies which expressed their aims in more general terms such as "to characterize patients with asymptomatic restenosis, and to determine the usefulness of late exercise testing…" or "we wanted to further define the success rate, complications and prognostic factors associated with semiconductor diode transscleral cyclophotocoagulation" could be related to weaker initial claims, or the claims were first motivated by an amount of background information. However, this type of study aim was more likely to lead to a progressive style Discussion, as illustrated by sample text 7.

#S0	# To better classify this heterogeneous group of subepithelial blistering mucous membrane diseases, we conducted a 6-year comprehensive study on all new patients whose diagnoses fit within the spectrum of bullous pemphigoid, benign mucous membrane pemphigoid, and ocular cicatricial pemphigoid.
#S1	# Distinct patterns of immunopathology and antigenic specificity of autoantibodies correlated with distinct subsets of patients with immune-mediated subepithelial blistering diseases of mucous membranes.
S2	Because the patient population was drawn from the departments of dermatology, ophthalmology, and oral pathology and identified through a diagnostic test administered by the pathology department, selection bias toward predominant expression in any one organ system is minimized.
S3	Our data indicate that at least two distinct groups can be clearly defined within this heterogeneous group of patients.

Sample text 7. Discussion with progressive style related to a descriptive aim in the Introduction section

In this example, the Discussion opens with a statement of finding (S1) signalled by the typical past tense. This is supported by a minor claim on the methodology (S2) that validates the finding before the main claim that the authors have clarified the classification of these blistering diseases. The neutral evidential verb *indicate* and the fact that only two groups "can be clearly defined" attenuate the claim and motivate the choice of the progressive discourse style. The Discussion then moves into a descriptive mode characterising in turn the different patient groups analysed. In another study, as we have seen in relation to randomised trials, a negative result correlates with choice of the progressive style.

What we have observed for prospective studies also appears to hold true for large retrospective studies and small case series. Statement of a clear study design in the Introduction will be reflected at the start of the Discussion with a claim if the evidence is strong enough. "In this study, we compared the outcome of aortic valve replacement for aortic stenosis in patients >80 years old with that of patients 65 to 75 years old." This comparative design leads to an evaluative claim at the opening of the Discussion: "The most important finding in this study is that despite their poorer postoperative condition, patients >80 years old who undergo aortic valve replacement for aortic stenosis have a favourable postoperative course that is similar in many respects to that of the younger age group." This is clearly not a plain statement of the finding itself, but is coloured by the authors' subjective evaluation through the adjectives "most important" and "favourable", while use of the present tense generalises the finding in the context of aortic replacement in the elderly. While not as strong as the claims in the prospective studies, the evidence is strong enough for the authors to choose the argumentative retrogressive style without fear of having severe criticism levelled at them for overstating their knowledge claim.

Even in the studies with the weakest design structure, a claim to originality can justify choice of the retrogressive style. In one dermatology study, the case series was presented in purely descriptive terms: "We report 20 cases of pemphigus foliaceus, all of them involving young women seen from November 1985 through January 1987 in Sousse, Tunisia." Nevertheless, the data supported an early claim for originality in the Discussion section: "Our series presents original epidemiologic peculiarities." After this, the Discussion again moves into the descriptive mode.

Thus, there is some evidence in the English language subcorpus that in prospective studies, retrospective studies and small case series, it is the strength of the evidence that determines the choice of discourse style. The strong link between the presentation of the study in the Introduction and the style of the Discussion, especially when the retrogressive style is chosen, lends support Swales' (1984) contention that Introductions are written late, or rewritten, after the other sections have been completed, and are "essentially exercises in public relations". It also confirms that the research article is an artefact that constructs knowledge through persuasive argument rather than narrating scientific research in the chronological order in which it was carried out (Myers, 1994).

In the Spanish subcorpus, the situation is clearer in that, for case series of all types, authors prefer the progressive style, which is suitable both for the largely descriptive series reporting the authors' experience with a particular entity or technique and for other studies where writers prefer to build an argument in an iconic chronological order reflecting how the study developed and the data emerged. A previous contrastive study (Williams, 2005) on the same corpus revealed a different attitude to research and research reporting between English language and Spanish articles. Articles published in English language journals are characterised by a "separatist" view of research that distinguishes between the performing of the study (past tense: *The study showed*) and the act of writing or publication (present tense: *This report describes*). In contrast, Spanish Discussions reveal a "unitary" view of research, as illustrated by the word *trabajo* (literally 'work' but more usually 'study', 'report', 'paper' depending on the context), which covers the whole research process, and through greater use of the present tense, which signals relevance to the ongoing development of the argument in the Discussion. Spanish Discussions, therefore, often return to the start of the

process and contextualise and motivate the study, restate aims, and mention methods before coming to the interpretation of the results, which is often assumed to be the function of the Discussion.

Sample text 8 is a complete short Discussion section with this kind of progressive through-argumentation. From the initial report in 1984, the authors give a rapid overview of relevant research (S1), and then state the problem to be addressed, the adequate dose (S2). The text then moves inward to the current study and gives the range of doses used and the overall result (S3). There follows a series of more general findings (S4-S7) on different aspects of the study. It should be noted that S5 also includes a limitation on the data, which weakens the strength of the evidence. The final statement (S8) conflates the main claim (*we believe*) with a recommendation for clinical practice with the conditions for use.

#S1	# Since 1984, when Bunn *et al* (1) reported an objective response rate of 45% with interferon alpha in advanced stages of cutaneous T-cell lymphomas, there have been numerous published studies that in general support the effectiveness of this treatment in cutaneous T-cell lymphoma in different stages both when used alone (2,4-11) and when combined with etretinate (12-14) or PUVA [psoralen + ultraviolet A therapy] (15,16).
S2	The optimum dose has not been established, but it appears that low doses may be less effective than larger doses.
#S3	# In our centre, patients with early and advanced stage T-cell cutaneous lymphoma were treated with doses varying from 3 MU/3 times to 18 MU/day and the mean objective response rate was 86%.
S4	The response was somewhat better in early (100%) than in late stages (70%).
S5	The response was also slightly better in patients who tolerated larger doses of interferon although the number of patients was too small to draw conclusions.
#S6	# Recurrences were frequent with no clear relationship with clinical stage or tolerated dose.
#S7	# In our experience, the treatment is well tolerated and, although the adverse effects required treatment to be suspended in four patients, they were always reversible.
#S8	# Thus, we believe that this treatment should be considered in cutaneous T-cell lymphoma, especially in cases of extensive plaques of fungoid mycosis for which PUVA is not possible, and in advanced stages refractory to other treatments.

Sample text 8. Complete Spanish Discussion exhibiting the progressive discourse style and a unitary view of research

However, there are six exceptions in the Spanish subcorpus where authors have selected to open the Discussion with a claim. Two of these have already been mentioned (see table 12, examples 4 and 5) as examples of weak claims. A third Discussion opened with a limitation (table 12, example 2), which, as is often the case, is followed by a counterclaim or rejoinder that restricts or nullifies the effect of the limitation. In this case, the writer is well aware of the nature of the retrospective data he has drawn on, and warns the reader from the outset.

#S0	# Recently, analysis of the rearrangement of the bcr/abl gene by the Southern blotting technique is being used as a clinical laboratory test for diagnosis and monitoring of therapy in chronic myeloid leukaemia (CML) (8).
S0	This article presents the current authors experience in this respect and also analyses six of the patients with CML in blastic crisis.
#S1	# In this study DNA analysis was performed in all cases with the Bg/II restriction enzyme and the complementary DNA probe TransProbe 1, since the results of our previous unpublished studies with the Bg/II and Bam HI enzymes and the Pr-1 probe showed lower sensitivity in the analysis.
S2	This has been confirmed by other studies (8,14-16).
S3	Nevertheless, the complementary use of the two probes in the DNA study of each patient allows us to delimit the breakpoint cluster region and, thus, to determine whether there is a relationship between this breakpoint and the onset of the blastic crisis or with shorter patient survival time (16-19).
#S4	# The results of this study indicate that use of the Southern blotting technique to analyse the bcr/abl gene rearrangement is a sensitive and specific method for the diagnosis of CML, as has been reported by other authors (8,14,15).

Sample text 9. Spanish Discussion with retrogressive style related to a descriptive aim in the Introduction section

Of the remaining three studies, two were large retrospective series and one a prospective study. In two studies, background context preceded the opening claim and only one retrospective study opened with this Move. As in the English language examples, there was a close link between the presentation of the research in the Introduction and the early claim, even when the study lacked an explicit goal, as in sample text 9. This text also illustrates the Spanish tendency to open the Discussion with contextual background adding more detail to the information provided in the Introduction. The first three statements (S1-S3) justifying the methodology used could well have been adapted and inserted between the last two sentences of the Introduction (S0). The claim (S4) displays one of the characteristic formats, but since the findings of the current study merely confirm those previously reported, the neutral verb *indicate* reduces the force of the assertion.

Much the same can be said for the other retrospective study in which the aim was expressed in broad descriptive terms: "The aim of our retrospective study was to assess the frequency and epidemiological characteristics of invasive Hib infections in Spain." Nevertheless, the opening claim used one of the strongest formulas: "The results of this study show that Hib infections are a common cause of serious illness in the paediatric age." The authors stress the seriousness of the problem, and this allows them to construct a persuasive case for the introduction of a vaccination campaign into the Spanish immunisation programme, as has been recommended in the USA and other European countries.

The final retrogressive style Discussion belongs to a complex cardiology study in which the authors use measurement of peak oxygen consumption (peak VO_2) to relate cardiac output with a number of variables in patients with hypertension. These are clearly stated at the end of the Introduction. The Discussion opens with considerable background information (20% of the section) mainly on the methodology and its underlying rationale. In spite of this, the style from then on is clearly retrogressive and opens with the strongest of the formulas: "Our data demonstrate that hypertensive patients without antecedent angina or infarction who have shown left ventricular failure with preserved systolic function may, after control

of pulmonary congestion with a diuretic, present a clinical and physiological profile similar to that of patients with hypertensive disease who never showed symptoms." It should be noted that the strength of the formula is later attenuated with the modalised verb *may present*. After this broad general claim for this patient group, the authors go on to analyse the factors mentioned in the Introduction in cycles that are mainly retrogressive but include progressive elements.

6. Conclusion

This study provides empirical evidence of two clearly differentiated discourse styles that are used in the Discussion sections of medical research articles. The statistical and qualitative analyses comparing the two subcorpora indicate differences between the style of the English language publications in which the retrogressive style predominates and that of the Spanish journals where an even stronger preference is observed for the progressive style. Although cultural factors undoubtedly play a role in the choice of style, it is not a sufficient explanation in itself for the choice of discourse style since both styles were evident in the two subcorpora. The subanalysis performed on the English language articles distinguishing between native authors and non-native writers of English showed that the non-native writers, who came from a wide range of national backgrounds, are successful in adapting to the disciplinary and stylistic requirements demanded by English language journals.

The most important determinant of choice of discourse style to emerge from the analyses is the type of study. Studies with the most rigorous design yield the best empirical evidence and were found to correlate with the retrogressive style since this style enables authors to foreground the strongest knowledge claim which they believe they can persuade their peers to accept. The larger proportion of randomised clinical trials in the English language subcorpus accounted for much of the difference between the English and Spanish texts. However, even among the study types with less rigorous designs, the English language writers sought to take every opportunity to make as strong a knowledge claim as possible right from the outset. Conversely, any weakness in the data produced with the strongest study design could lead to a weakening of the claim, covering the claim with background information, and in the last resort switching to the progressive style.

The scant presence of the retrogressive style among the case series – whether prospective, retrospective, or small case series – suggests that the progressive style is an almost automatic choice for Spanish writers in their native language. If this is the case, they must make a great rhetorical effort in order to have their work published in English language journals and thus emulate the non-native writers included in the sample studied here.

The data and the sample texts presented in this paper can serve as models and guidelines for the structuring of the two discourse styles, and as an indication of how the key moves are expressed. More general recommendations suggested by the data would be to reduce the background information in the Discussion by including it in a more elaborately developed Introduction section, written or reworked even after completion of the other sections. This could be achieved by constructing the Introduction along the lines proposed by Swales (1984) as a promotional exercise so that it ends with a clear statement of the hypothesis to be tested, the question or questions to be addressed, or the primary and secondary aims of the study. Depending on the quality and strength of the data obtained, these hypotheses, questions and aims can be linked to the strongest possible claim either at the head of, or as early as possible, in the Discussion. Claims for originality and evaluative

statements may be sufficient justification for choosing the retrogressive discourse style since these make it clear to readers where the argument is going to take them, and this can be followed by a switch to a more descriptive style as an alternative option.

If methodological questions are deemed necessary as background information, they should be motivated by stating the underlying rationale. Negative outcomes and any fundamental weaknesses in the data appear to make the retrogressive discourse style incompatible and require a carefully constructed progressive argument to make a convincing case for publication and acceptance by peer readers.

In conclusion, this study has shown that the choice of the retrogressive or the progressive discourse style for the Discussion section of medical research articles is only partly dependent on cultural differences in the use of rhetoric, and that the type of study undertaken and the quality of the evidence produced exert a complementary and stronger influence on this choice. The finding that non-native writers are successful in adopting the appropriate discourse style is testimony to the great rhetorical effort they may have to make if the discourse style does not conform to their cultural mind set and their professional and disciplinary recognition and advancement depends on publishing their work in leading scientific journals.

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