8. A PROCESS AND PRODUCT ORIENTED APPROACH TO WRITING MEDICAL ESSAYS

Nicolás Estévez and *Jordi Piqué*
Universitat de València

Introduction

Spanish health science professionals complain they lack the ability to convey in writing –and in English– the results of their research. Our intention is not to analyze this problem, but to study the most relevant characteristics in the development and learning of this writing process technique and to propose an approach with a view to develop written communication skills for future professionals.

The purpose of this essay derives from the need medical professionals have to acquire linguistic autonomy in English in order to compete in the international scientific world. It has already been suggested that "Spanish academics and research workers, if they wish their work to have any influence on the world of science, will have to publish in English" (St John 1987: 114). Indeed, according to Swales (1987: 42), half of the research papers published every year are written in English. In addition, about 80% of the world's biomedical literature is written and published in English (Maher 1986: 206-208). And, according to some investigators, in the last twenty years the use of English in biomedical literature has increased enormously. Databases such as 'Medline' verify these assertions (Gartland 1993: 56-59).

A survey of health science professionals in hospitals within the Valencia region showed that the professionals surveyed rarely published their findings in English (Piqué & Estévez 1991). This does not mean that they lack the scientific expertise to compete with their international colleagues, but rather inadequate English language skills prevent them from being published. Maher (1986: 216) has pointed out that "a whole range of skills is required urgently by doctors overseas especially in the field of reading and writing."

As teachers of future health professionals, we therefore feel obliged to outline practical guidelines for developing writing skills. Medical professionals often present

the results of their investigations in a disorderly way. This is problematic, since a medical article must have an aesthetic form which is different from other scientific, literary and/ or scientific essays.

Although some experts think writing can not be taught, we agree with Chernin (1981: 40) that writing is a skill that must be learned. Our research is focused on the process of organizing and writing a medical essay, which requires specific forms of expression that distinguish it from other literary or commercial texts.

Review of literature: A review of the literature on developing writing skills shows that most studies emphasize mainly academic aspects. Some papers underscore the written expression techniques required by students of science and technology, both graduate (Windsor 1990; Buell 1991; Casanave & Hubbard 1992) and undergraduate (Horowitz 1986; Braine 1989). An exception though is Gartland (1993), who has given some pedagogical pointers on written and oral communication skills to medical students and professionals. A lot of research on writing, however, has focused on three basic issues: faculty evaluation of students' writing problems (Casanave & Hubbard 1992; Jenkins, Jordan & Weiland 1993); writing tasks (Horowitz 1986; Braine 1989); and writing problems of native and non-native students (Richards 1988).

As Casanave and Hubbard suggest (1992; see also Parkhurst 1990), the difficulty non-natives face (their survey was conducted among native and non-native students at Stanford's International Center) when writing an essay in English has not received much attention. In addition, even less has been said about recommendations on communicative skills for non-native professionals (Barnes 1982).

We highlight a further difficulty, that experts have neglected, which Meyer (1975) in his "Letter from ... Paris" specifies (i.e., the difficulties encountered by French scientists when writing essays in English). We refer to non-English speaking professionals who attempt to write an academic essay in a non-English-speaking country. They encounter language problems because they do not commonly use English. Our paper is not a survey of available materials and bibliography. Bibliography on writing scientific essays exists but it is often difficult for Spanish professionals to access.[1]

Non-native authors of scientific essays in a non-English-speaking area lack many of these materials and must, therefore, seek assistance from another source than that provided in most bibliographical materials available. This problem has been focused from a broader viewpoint, and basically as part of scientific writing, in terms of essay organization and style (Ratnoff 1981; International Committee of Medical Journal Editors

1. The literature has addressed format problems in general (Day 1988; Maher 1992; Gartland 1993), stylistic problems in particular (Aaronson 1977; *The Chicago Manual of Style* 1982; Goodman & Edwards 1991), general writing skills (White 1988; Bloor & St John 1988; Brookes & Grundy 1990; Campbell 1990), including verb tense and modality distribution (Salager-Meyer 1992), clause organization (Banks 1994), etc. Works are also available on specific sections of academic writing, such as title (Dudley-Evans 1984), abstract (Cremmins 1982; Lancaster 1991; Posteguillo 1996), introduction (Swales 1981; Jordan 1988; Bhatia 1993), argument (Hyland 1990), citation (Dubois 1988; Jordan 1990) and the role of reporting verbs in citations (Thompson & Ye 1991; Thomas & Hawes 1994), results (Brett 1994), discussion (Hopkins & Dudley-Evans 1988), and bibliography (Lynch & McGrath 1991).

1982; Huth 1987; etc.), and usually through Spanish translations. A typical example is Robert Day's publication. Although it appeared in 1979, the Spanish translation was made available in Washington by the Pan American Health Organization in 1990, when its third English edition (1988) was already in print. Furthermore, Spanish professionals writing in Spanish can readily use the Spanish edition of Day's manual for information that might be useful as well as for Spanish "moves" included therein.[2] However, the information useful to Spanish professionals writing in Spanish will not be as useful to them when they write a paper in English. In short, Day's original English text would be a better choice for their work. On the other hand, literature on writing by Spanish ESP professionals is scarce, and tends to focus on the need for science professionals to improve their writing skills (cf. Montero Fleta 1990).

In this paper we will draw our young professionals' attention to structure and method, and give them a series of "moves," taken from journals on medicine and allied health sciences, for essay writing. This, of course, is no substitute for reading. Writing an academic essay in English requires a good command of the language. However, many writing problems would be reduced by using a simple style. This would in fact lead to the writer-reader contract that Frank Smith (1982) advocates.

The Writing Process

Writing a medical essay requires language proficiency and careful attention to its planning and implementation. This skill, often considered less important in academic circles when compared with other language learning skills, has subsequently received little attention in publications (Master 1986: xiv), even though recently the trend seems to be changing.

White (1988: 5) views writing "essentially as secondary and in some senses inferior to the spoken language." He further notes that it is essentially used as a means of reinforcing language which has "already been dealt with in spoken form" (cf. also Brookes & Grundy 1990). Tony Silva (1990: 12), in his historical sketch of teaching second language composition, writes that, since Charles Fries's oral approach, writing has been regarded "as a secondary concern, essentially as reinforcement for oral habits."[3] For this reason Brookes and Grundy (1990: 8) encourage an integrated approach to the teaching of skills through which we are able "to transfer naturally between one mode and another." They further add that "writing demands an integrated approach just as much as the other skills do" (p. 9).

Studies on the methodology of written communication emphasize general English,[4] concentrating on beginners who are developing their skills both as L1 and L2 (see, for instance, Arndt 1987). However, little research has centered on the training of

2. M. A. Bobenrieth Astete (1994) has recentlyt published a manual for Spanish-speaking scientists on essay writing –its structure, style, etc.– and on how to read an essay from a critical standpoint.

3. Actually a similar reaction occurred in the United States with the MLA oral/aural approach to teaching foreign languages.

students who already have a good command of English–students who need this skill to meet academic requirements and to communicate with other professionals in the future.

The increase of international scientific communication has generated the need to develop this skill, especially in English for Academic Purposes (EAP). Writing is a skill that cannot be improvised. To think otherwise is certainly a mistake. Long and tedious training is imperative if one is to write reasonably well. The process cannot be oversimplified, as Smith (1982: 118) indicates when he says that it is not just "a matter of putting one word after another, or translating successive ideas into words but rather of building a structure (the text) from materials (the conventions) according to an incomplete and constantly changing plan (the specification of intentions)."

Unlike textbooks, which are primarily "reader centered", journal articles are "topic centered," a vehicle of communication between experts. As Kourilová (1993: 6) points out, they "do not tend to teach and explain but primarily to inform on new development in the discipline." Nevertheless, even though readers of scientific essays may not be interested in style, we cannot altogether disregard accuracy and appropriateness. Teachers play an important role in the writing skills development process. Not only do they give instruction on the mechanics of basic composition, but they also psychologically prepare students for the difficult task of communicating through writing. Most importantly, teachers should instill in students' minds a realistic but not for that any the less positive attitude towards writing.

1. Writing Skills

In the praxis of learning to communicate orally, EFL students perform role play exercises; read and discuss case studies; as well as perform other activities in simulated real-life situations, employing audio and video cassette recordings, CD-ROMs, and other technical devices. The methodology used in teaching writing skills should stem from and be adapted to the needs students will eventually have if they are to carry out research projects in the future. This in itself would encourage them to face the writing process in a more positive vein.

Since many classrooms do not provide adequate material and the appropriate conditions for teaching writing, the procedure often leads to discouragement for both teachers and students. To begin with, EAP classrooms need to be provided with research material, published medical essays, health science encyclopedias, dictionaries, etc., for the purpose of quick and easy reference. This in turn will make the learning process more attractive.

To foster a positive attitude toward writing communication, Casanave and Hubbard (1992: 45) recommend getting students "to write from material they have read ... or to write activities they have performed." Bloor and St John (1988: 91) suggest that students should have on hand "topics with which they feel relatively familiar" and that they should "read so thoroughly on their project topic that they have no shortage of ideas or

4. During the 1970s and 1980s much research was carried out in the United States about writing, but it derived, at least in part, from ESL rather than from general English, and several publications on this issue appeared in journals such as *TESOL Quarterly*.

information"; in this way "students can be released from the problem of worrying what to write about."

As teachers, we arecertainly well aware that reading is an essential learning activity, as is the use of supplementary language material: vocabulary structures, idiomatic forms, medical jargon, etc. All of this, along with good textbooks, will better help learners to polish and execute their own essays. Obviously, a language cannot be invented: one needs to learn the rules and develop a style: "Even the most original academic paper–writes Campbell (1990: 211)–integrates facts, concepts and theories from other sources by means of quotations, paraphrases, summaries, and brief references." We have therefore come to the conclusion that reading is indispensable for anyone wishing to become a good writer. Actually, we all write from existing sources. As Goodman and Edwards (1991: 10) point out, we seem to write the way we do not only "because of what we read," but we also "write in a way we think is expected."

All too often students have studied a language for many years, but are still deficient in it. Such is the case of many of our students: though they have taken many English courses, they nevertheless have a long way to go. They lack the specific linguistic techniques needed to write a medical essay. In analyzing common errors of Italian medical professionals, Webber (1993: 40) finds that over 70% of them acknowledge errors based on lexis, articles, prepositions, present perfect vs. simple past, word order, and spelling -in that order. The author also points out that, while the most frequent errors are those of vocabulary, writers are influenced by their own language. For this reason, we recommend that they should write their essays directly in L2, and resist the temptation to translate from L1.[5] Reading and writing in English will provide health science students with the essentials they need to be able to do this. By reading materials appropriate to their particular field (for example, handouts and articles from journals) their interest will therefore be stimulated and their writing will subsequently improve.

2. Reception Stage (Input)

A broad-minded disposition towards reading will help students to obtain information from different sources, such as encyclopedias and journals. This in turn will help them to plan an essay better.

During the "reception stage" students compile the necessary linguistic material and adequate subject information to elaborate their essays. The teacher is a significant participant in the process, and his/her attitude should be that of an active spectator who creates and coordinates a suitable atmosphere. These pre-writing activities should take place in the classroom, not only because at the beginning stage the teacher supplements material to simplify receptive skills, but also because the students themselves can give each other psychological support with the teacher's proper guidance. Here the teacher's

5. This does not mean, however, that all native culture rhetorical patterns should be disregarded. As Rubin, Goodrum and Hall (1990) have emphasized, these discourse strategies, even if oral-based, should be integrated into ESL writing: "ESL writers can learn to incorporate oral-based elements –metaphor and narrative as proof, direct second-person address, certain uses of redundancy, oratorical cadences, and so on– that can enhance the effectiveness of their writing" (p. 73).

main concern should be to advise rather than correct, so as not to exacerbate any latent insecurities the students might harbor during the writing process.

3. Pre-Writing (Selection and Use of Materials)

Pre-writing is an activity which makes use of various techniques and assorted materials so that students can obtain information and linguistic resources. Language specialists have suggested divers pre-writing techniques, such as listing, clustering, grouping, matching, and brainstorming. However, as text analysts have stated, students should be taught first to follow the general rhetorical principles involved in English composition, as enumerated by Robinnett (1978: 233): "the logical organization of sentences within a paragraph, the linking of sentences within paragraphs, and the organization of whole compositions."

Pre-writing techniques can thus help students to arrange information gathered through reading, since "the role of schemata in writing is to provide a top level framework for structuring the discourse" (Davies 1988: 132). Schemata will help students to avoid literary disorder.

However, being familiar with pre-writing techniques ought not to condition students, but rather to provide them with freedom enough to choose, plan and design their own working patterns. The only condition is that they should feel at ease with their own models, which provide them with sufficient support for writing essays.

Students, at the stage of selecting and organizing materials need to be receptive to suggestions, possibilities, references and ideas that the reading activities provide. In this way, they can combine this information with their own knowledge of the subject.

As far as the order which the ideas should follow, the process of elaboration is susceptible to change. Accordingly, students need to be flexible and to respond with an open attitude to the suggestions which they encounter in reading. Furthermore, a sense of liberality in terms of sharing ideas, is also desirable. As Brookes and Grundy (1990: 23) noted, "the act of writing often sparks off new ideas."

4. Backward and Forward Movements

The process of selection gives students the necessary information with which to organize the ideas they will use during the next step in the writing operation. At this stage the students face a critical uncertainty that sometimes leads to despondency. At this point, it becomes necessary for teachers to give them some psychological support, if their students are to overcome their difficulties, and not abandon their projects.

During the writing and re-writing processes, many learners are overwhelmed by the task. They come to the conclusion that writing well is only for a select few. For this reason, students need help in recognizing that "writing is learned by writing and reading, and perceiving oneself as a writer" (Smith 1982: 199).

When students move into the creative part of essay writing they expand on the material they have selected. During this stage, attention to the mechanics of writing can be temporarily suspended.

The next stage is more complex, since the ideas, references, summaries, laboratory research, and sources of other writers must be selected or discarded. In order to achieve the best results, authors use a gamut of strategies, including writing, re-writing, reading, re-reading, formulating, re-formulating, modifying, composing a rough draft and re-draft, etc. Davies (1988: 134) describes this occasionally tiring (but often rewarding) business as a movement "backwards and forwards from writing to reading, supported at different stages by analysis." Writing and re-writing in effect becomes a process of discovery.

5. Final Draft and Editorial Policies

Acquiring a writing habit helps students to organize and plan the different parts that constitute a medical essay increasingly better. This is of extreme importance. Some international medical journals have their own editorial policies, in which the editor specifies the requirements of articles submitted for publication. The International Committee of Medical Journal Editors (1982) has established a certain amount of uniformity, which most well-known international biomedical journals follow.

Organization and "Moves" in Medical Essays

Authors investigating the organization and structure of research articles (particularly Swales 1990; Atkinson 1992, among others) agree that there is a generalized macrostructure. Hill, Soppelsa and West (1982) have devised what they call an "hour-glass diagram," which they use to describe shifts from statements of a general nature, or propositions ("introduction"), to particular ones ("procedure," which includes both method and results), and then back to the general kind ("discussion") (see Figure 1). According to these authors, scientific research essays "make the transition from the general field or context of the experiment to the specific experiment by describing an inadequacy in previous research that motivates the present experiment" (Hill, Soppelsa & West 1982: 335).

Figure 1. Hour-Glass Diagram (Hill, Soppelsa & West 1982: 335).
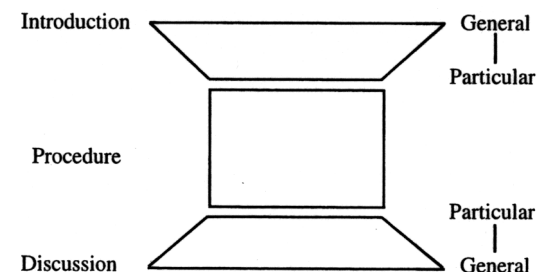
This model, which acts as what Swales (1990: 133) calls a "manageable starting-point for a discussion of shape of macrostructure," provides students with a brief outline which they can follow when writing a medical essay. Other authors, however, have proposed different organizational procedures for scientific essays, most of which could practically fit in the macrostructure Introduction-Method-Results-Discussion (IMRD) (Swales 1990: 133ff.).[6] Other authors (e.g. Day 1988) have broadened this by introducing subsections (see Figure 2).

Figure 2. Basic Moves in Scientific Essays (e.g., Day 1988).

Basic Moves	Subsections
Introduction	Review of Literature
	Hypothesis/es
Methods	Procedure
	Subjects
	Equipment or Instrumentation
	Data Analysis
Results	Analysis of Results
Discussion	Conclusion/s (Acknowledgments)
	References

The presentation of a macrostructure such as the IMRD does not necessarily mean that students and/or inexperienced writers must begin their essays with the Introduction. They could, in fact, "begin with the easiest section. This may be Methods, for you should know what you did" (Booth 1993: 3).

Let us now turn to Swales' *Genre Analysis* (1990), in particular the chapter entitled "Research articles in English." If we consider the textual genres, analyzing each of the main sections that constitute a medical essay, we are forced to admit that medical literature tends to be rather conservative in its exposition and therefore distinct from other areas of scientific research, especially with regard to form and the presenting of results.

Within this macrostructure, each section contains a specific communicative function implemented through the use of different linguistic patterns. While the "Introduction" and "Discussion" are often used as "commenting sections," in which the author identifies with or distances himself from different interpretations, "Methods" and "Results" are usually "factual"; the author simply presents data and results without commenting on them (see Kourilová 1993: 7-8). Notwithstanding the subjectivity of the "Introduction" and the objectivity of the "Discussion," the two sections, nevertheless, are complementary.

1. Introduction

In the "Introduction," the researcher succinctly presents the objective of the investigation, and briefly refers to studies made previously by other researchers on the

6. Maher (1992) expands this macrostructure to TAIMRAD–i.e., Title, Abstract, Introduction, Methods, Results, And Discussion–, produces an extensive listing of sentences employed in different "moves," and provides language functions most commonly used in medical writing.

subject. It is important for students to understand that a clear aim is necessary and should be introduced as concisely as possible. In this way, the reader knows from the beginning what to expect from reading the essay, and can thus anticipate what is to come and thereby better follow the author's intention (see Swales 1990: 137-166, for a detailed description of moves involved in an essay introduction). Two writers describe the effectiveness of helping the reader to anticipate. Robert Day (1988) suggests that a surprise ending of the sort O. Henry used in his short stories may be good literature, but hardly seems fitting for scientific writing. Ratnoff (1981: 97) holds "we want to know from the very start that the butler did it."

Some of the "moves" a writer can employ to improve an introduction include the following:

* *The purpose of the present study is to determine ...*
* *Previous studies have shown that with this technique it is possible to increase ...*
* *This article will analyze the phenomenon of self-concept ...*
* *There is little research on how nurses actually assess pain.*
* *Most of the studies described thus far have been limited to ...*
* *Recent investigations have emphasized ...*
* *The aim of our study was therefore to assess ...*
* *Different research methods may isolate different aspects of the diagnostic process.*

2. Materials and Methods

(a) In the "Methods" section, emphasis is on the relevant aspects of the essay. If the investigation is based on a human related subject, researchers describe not only the characteristics of the people they have assessed or surveyed but also they explain the principal motives for their investigations. In addition, demographic characteristics of the sample may also be added.

Notwithstanding the suggestion by some authors (e.g. Gartland 1993: 77; see also Bhatia 1993) that the methods employed in medical essays should be specified in the "Introduction," the "Methods" or "Materials and Methods" section adequately facilitates their presentation with more detail. Some of the more typical expressions that might be used to introduce subjects include the following:

* *All subjects had some running experience ...*
* *Each subject completed one preliminary and four experimental testing sessions ...*
* *Data were gathered by asking subjects to respond to the following questions ...*
* *No patients with history of coma, new cognitive deficits, or other signs ...*
* *The ages of sample respondents were distributed as follows ...*
* *Minimum demographic data were used focusing primarily on age, education, marital status, and race.*
* *None of the subjects showed clinical, ECG, chest X-ray ...*
* *A nonprobability, convenience sample of 14 subjects with an established diagnosis of cancer comprised the study population.*

(b) Since the validity of the investigation is often based on the type of the instrumentation employed, researchers can utilize a subsection called "Instrumentation"

to describe and specify the various types used. Moreover, knowing that other scientists depend on accuracy in order to confirm the scientific validity of the essay (Gartland 1993: 78), this subsection of the "Materials and Methods" should combine precise language and sufficient enough references to validate and give it consistency. Furthermore, if the instruments used are new (i.e., unpublished) these need to be described in detail (i.e., make, model, capacity, etc.). The following introductory elements can be used as appropriate "moves."

* *Walking speed was calculated as the ratio between ...*
* *Limb volumes were determined via plethysmography.*
* *Instrumentation followed that was described by Bettany and colleagues ...*
* *Cathodes, also self-adhering electrodes, were applied below the water's ...*

(c) "Procedure" is another convenient subdivision in a medical essay. To provide the results of the investigation which are guaranteed scientifically, researchers explain the methodology used. In this section we underscore the following "moves":

* *Chart audits were completed over an approximate 30-day interval, concurrent with staff and administrative surveys.*
* *During each testing session, at least two walking tests were made ...*
* *The four controls were tested once, only using two gait samples for each ...*
* *Content validity was obtained by submitting items on the questionnaire to a panel of five researchers ...*
* *Ambiguous directions and questions were clarified based on pilot responses.*
* *The survey consisted of 14 questions and took approximately 15 to 30 min. to complete.*

(d) In the "Data Analysis" section, researchers specify the time, the different tests and the number of patients examined for the purpose of the investigation. Authors record all measurements and data analyses clearly and accurately. They also answer questions such as "how" and "how much" with precision. As a rule, this segment of the essay should supply enough information so that a competent colleague can reconstruct the experiments. Consequently, in the "Data Analysis" section inexperienced authors should realize that accuracy rather than fluency is the primary concern. Additionally they should avoid introducing the results of their experiments in this section.

The following are some of the many "moves" one can use in the "Data Analysis" section:

* *After the questionnaire was given, the alpha coefficient was calculated for internal consistency ...*
* *Pearson's R and phi coefficient were used to compare responses ...*

3. Results

The section called "Results" represents the core of the essay: the data. Authors, however, must be selective in relating the results achieved, since, as Aaronson (1977: 13) has suggested, to include everything without omitting a single fact, does not show

that one possesses unlimited information, but rather that one lacks the capacity to discriminate.

Since results represent new knowledge, clarity is fundamental. Therefore, authors should eschew the common tendency to overwrite. In this respect, Salager-Meyer (1993: 11) warns against imprecise language in today's medical discourse, especially against 'overhedging,' "which renders the message confusing and even incomprehensible." Furthermore, Einstein is quoted as having said: "If you wish to describe the truth, leave elegance to tailors." In scientific writing, therefore, there can be "no place for style that imparts mood and emotion to the words; we are reporting facts –we read in Goodman and Edwards (1991: 10)–, and stating opinions based on them and their relation to other facts."

Often data are presented in tables, figures, or graphics and require accurate and clear descriptions, i.e., they should be clear without reference to the text. Above all, text and legends must be consistent (cf. Booth 1993: 5). Some possible "moves" for this section are the following:

* *The patients with persistent right bundle branch refused transoesophageal ...*
* *In two cases, the P-wave was retrograde; one of them corresponded ...*
* *After 35 min., atrial activity reappeared, with positive anterograde ...*
* *As can be seen in Table 1, the overall mean for physical suffering was 3.1 (SD=.637).*
* *There was a significant relationship between the age or health status of these respondents.*
* *The effects of weight bearing and exercise on BMD have been documented ...*
* *The results of this descriptive study were encouraging and suggested three findings.*

4. Discussion

(a) Having described the results obtained in performing the study, authors continue in this section to discuss the significance or relevance of their findings and explain how they add to existing knowledge. This is probably the most difficult section of the essay, due to possible inaccuracies and to speculation which has not been supported by the results. It is even conceivable that a good essay with excellent results may be rejected by journal editors because of a deficient "Discussion." At this juncture it is essential for authors to defend their scientific contribution and make comparisons with other investigations published in their fields. They should also report difficulties they may have encountered and errors committed, as well as offer recommendations for further research. In view of these obligations, we find the following "moves" useful:

* *An analysis of the data collected demonstrated a high agreement between ...*
* *Analysis of the responses are in line with the belief that ...*
* *Our previous investigators have attempted to correlate neuropsychologic ...*
* *Further case reports will be necessary to establish the true outcome of RSV ...*
* *One might speculate that the real circumstances of this obese man led ...*
* *Research is needed to define more precisely the complex nature of the pain experience as it continues to make assessment of pain difficult.*
* *We would encourage other physicians to inform state health departments when ...*

(b) In the "Conclusion" section, which most often forms part of the "Discussion" segment (see Fig. 2), researchers, through simple, clear and accurate sentences, point out the goals that prompted their research and admit whether or not they arrived at a satisfactory conclusion. The following "moves" could apply:

* *Perhaps the only real conclusions that could be drawn from this ...*
* *The limitations of the treatment in this study lead us to recommend more ...*
* *We have described the management of a patient with limited shoulder motion ...*
* *We conclude that the use of a shoulder elevation splint may be useful ...*
* *Further study is necessary before any substantive claims ...*

(c) In the "Conclusion" section authors may also acknowledge whatever important technical assistance they may have received, including provisions of, or grants for, equipment and other material used in their research. A simple sentence will often suffice. In many recent publications, however, this section has been reduced, at most, to a simple footnote at the beginning of the essay, or a marginal note within one of the major section.

* *We thank Sverre Larsen for his assistance with the illustrations and ...*

5. References

The main text of a scientific essay is usually followed by a section which includes references used during research and essay writing. While the section on "References" only requires that one follow the journal's editorial policies, or a standard style manual (e.g., *The Chicago Manual of Style 1982*, or Huth 1987), it is also necessary for the author to pay close attention to this section, for here one finds the most errors. According to an experimental study based on a survey of undergraduates which Singh and De Sarkar (1993: 23) completed, almost 64% had not entered the bibliographic details properly.

A Note on Verb Tense

As mentioned above, an adequate selection of words and sentences is fundamental when writing a scientific paper. Although this paper has not focused on style, grammar and mechanics, the close relationship between form and function cannot be overlooked, as the literature has done so far (Salager-Meyer 1992: 94).

However, we would like to take this opportunity to stress the importance of an adequate verb tense selection. Day (1988: 159) points out that verb tense choice has a direct relationship to scientific ethics. In this respect, he favors the idea that the present tense should predominate in the "Introduction" since, as is usually the case, it makes reference to existing and established knowledge (e.g., a possible frame of reference, theoretical background, or review of literature), while in the "Materials and Methods" and "Results" sections, which reflect the writer's own research, the past should

predominate (see also Goodman & Edwards 1991: 123). But in the "Discussion" part of the essay, where one's own results are compared with existing knowledge, the verb tense would switch back and forth from past (the writer's own results) to present (established knowledge). Malcolm (1987), however, approaches tense usage from a generalist and diverse perspective; she proposes that a theory of tense usage in scientific discourse "needs to account not only for obligatory constraints on tense usage, but also for strategic choices that provide authors with the capability of manipulating temporal references for their own rhetorical purposes" (1987: 32). In her analysis she finds the present tense is used in generalizations (74%), while the past tense is found in 61% of references to specific experiments. On the other hand, in references to different areas of inquiry authors will tend to use the present perfect (74%).

If we consider abstracts, from a rather broad point of view, as a "mini-version" of the article they precede, this verb tense distribution is certainly consistent with Salager-Meyer's (1992: 99) findings in reference to medical abstracts in which both "Methods" and "Results" would appear in the past tense (88.6 and 92.2 %, respectively), while in the "Conclusion" section the present tense would predominate (77.5%). In regard to the "Introduction," she distinguishes between "statement of the problem" (59.5% would appear using the present, 30.4% the present perfect, and 8.9% the past) and "purpose" (28.6% in the present and 57.1% in the past).

Conclusion

By using this framework, one may argue that we are limiting the creative capacity of writers. Certainly, over-zealous planning and strict adherence to precise 'rules' can often be more of an obstacle than an aid in the actual writing of text; nevertheless it is also true that medical essays require precise organization and "a high degree of accuracy so that there is no ambiguity of meaning" when using "complex grammatical devices for focus and emphasis; and a careful choice of vocabulary" (Hedge 1988: 5).

The practical application of an activity at its outset creates confusion and a sense of inadequacy. However, these symptoms, inherent in the initial creative stages most writers experience, are difficult to avoid. At this stage inexperienced writers should learn that hesitancy can at the same time provide a receptive, creative and open attitude to new possibilities, until experience in writing gives them confidence.

References

AARONSON, S. (1977). "Style in scientific writing." *Current Contents* 2: 6-15
ARDNT, V. (1987). "Six writers in search of texts: A protocol-based study of L1 and L2 writing." *ELT Journal* 41: 257-267.
ATKINSON, D. (1992). "The evolution of medical research writing from 1735 to 1985: The case of the *Edinburgh Medical Journal*." *Applied Linguistics* 13: 337-374.

BANKS, D. (1994). "Clause organization in the scientific journal article." *Unesco ALSED-LSP Newsletter* 17/2: 4-16.

BARNES, G. A. (1982). *Communication Skills for the Foreign-born Professional.* Philadelphia: ISI Press.

BHATIA, V. K. (1993). *Analysing Genre: Language Use in Professional Settings.* London and New York: Longman.

BLOOR, M., and M. J. ST JOHN (1988). "Project writing: The marriage of process and product." In: ROBINSON, 1988, pp. 85-94.

BOBENRIETH ASTETE, M. A. (1994). *El artículo científico original. Estructura, estilo y lectura crítica.* Granada: Escuela Andaluza de Salud Pública.

BOOTH, V. (1993). *Communicating in Science,* 2nd ed. Cambridge: Cambridge University Press.

BRAINE, G. (1989). "Writing in science and technology: An analysis of assignments from ten undergraduate courses." *English for Specific Purposes* 8: 3-15.

BRETT, P. (1994). "A genre analysis of the results section of sociology articles." *English for Specific Purposes* 13: 47-59.

BROOKES, A., and P. GRUNDY (1990). *Writing for Study Purposes. A Teacher's Guide to Developing Individual Writing Skills.* Cambridge: Cambridge University Press.

BUELL, M. Z. (1991). "As the professors see it: Assignment descriptions and perceptions of international student performance in academic reading and writing." Unpublished MA thesis. Ohio University, Athens.

CAMPBELL, C. (1990). "Writing with others words: using background reading text in academic compositions." In: KROLL, 1990, pp. 211-230.

CASANAVE, C. P., and P. HUBBARD (1992). "The writing assignments and writing problems of doctoral students: Faculty perceptions, pedagogical issues, and needed research." *English for Specific Purposes* 11: 33-49.

CHERNIN, E. (1981). "First, do no harm." In: K. S. WARREN [ed.] (1981). *Coping with the Biomedical Literature.* New York: Praeger Publishers, pp. 40-65.

CHICAGO MANUAL OF STYLE, THE (1982), 13th ed. Chicago: University of Chicago.

CREMMINS, E. T. (1982). *The Art of Abstracting.* Philadelphia: ISI Press.

DAVIES, F. (1988). "Designing a writing syllabus in English for academic purposes: Process and product." In: ROBINSON, 1988, pp. 130-142.

DAY, R. A. (1988). *How to Write and Publish a Scientific Paper,* 3rd ed. Phoenix, AZ: The Oryx Press. (Spanish ed.: *Cómo escribir y publicar trabajos científicos.* Washington, DC: Organización Panamericana de la Salud, 1990.)

DUBOIS, B. (1988). "Citation in biomedical journal articles." *English for Specific Purposes* 7: 181-194.

DUDLEY-EVANS, T. (1984). "A preliminary investigation of the writing of dissertation titles." In: G. JAMES [ed.] (1984). *The ESP Classroom: Methodology, Materials, Expectations.* Exeter: University of Exeter, pp. 40-46.

GARTLAND, J. J. (1993). *Medical Writing and Communicating.* Frederick, MD: University Publishing Group.

GOODMAN, N. W., and M. B. EDWARDS (1991). *Medical Writing: A Prescription for Clarity.* Cambridge: Cambridge University Press.

HEDGE, T. (1988). *Writing.* Oxford. Oxford University Press.

HILL, S. S., B. F. SOPPELSA and G. K. WEST (1982). "Teaching ESL students to send and write experimental research papers." *TESOL Quarterly* 16: 333-347.

HOPKINS, A., and T. DUDLEY-EVANS (1988). "A genre-based investigation of the discussion sections in articles and dissertations." *English for Specific Purposes* 7: 113-121.

HOROWITZ, D. (1986). "Essay examination prompts and the teaching of academic writing." *English for Specific Purposes* 5: 107-120.

HUTH, E. J. (1987). *Medical Style & Format: An International Manual for Authors, Editors, and Publishers.* Philadelphia: ISI Press.

HYLAND, K. (1990). "A genre description of the argumentative essay." *RELC Journal* 21: 66-78.

INTERNATIONAL COMMITTEE OF MEDICAL JOURNAL EDITORS (1982). "Uniform requirements for manuscripts submitted to biomedical journals." *British Medical Journal* 284: 1766-1770; also in *Annals of Internal Medicine* (1982) 96/part 1: 766-771.

JENKINS, S., M. K. JORDAN and P. O. WEILAND (1993). "The role of writing in graduate engineering education: A survey of faculty beliefs and practices." *English for Specific Purposes* 12: 51-67.

JORDAN, R. R. (1988). "The introductory paragraph in Economics Essays and examinations." In: ROBINSON, 1988, pp. 63-66.

—— (1990). "He said: Quote...Unquote." In: T. DUDLEY-EVANS and W. HENDERSON [eds.] (1990). *The Language of Economics: The Analysis of Economics Discourse.* London: Modern English Publications. ELT Documents 134, pp. 79-83.

KOURILOVÁ, M. (1993). "Epistemic modality in written scientific discourse." *Unesco ALSED-LSP Newsletter* 15/2: 4-18.

KROLL, B. [ed.] (1990). *Second Language Writing. Research Insights for the Classroom.* Cambridge: Cambridge University Press.

LANCASTER, F. W. (1991). *Indexing and Abstracting in Theory and Practice.* Champaign: University of Illinois.

LYNCH, T., and I. MCGRATH (1991). "Bibliographic presentation." *Edinburgh Working Papers in Applied Linguistics* 2: 81-100.

MAHER, J. C. (1986). "The development of English as an international language of medicine." *Applied Linguistics* 7: 206-218.

—— (1992). *International Medical Communication in English,* 2nd ed. Ann Arbor: The University of Michigan Press.

MALCOLM, L. (1987). "What rules tense usage in scientific articles?" *English for Specific Purposes* 6: 31-44.

MASTER, P. A. (1986). *Science, Medicine and Technology: English Grammar and Writing.* Englewood Cliffs, NJ: Prentice-Hall.

MEYER, P. (1975). "The English language: A problem for the non-Anglo-Saxon scientific community." *British Medical Journal* 2: 553-554.

MONTERO FLETA, B. (1990). "La expresión escrita como necesidad en el aprendizaje de inglés en escuelas técnicas." In: F. GARRUDO and J. COMESAÑA [eds.] (1990). *Actas del VII Congreso Nacional de Lingüística Aplicada. Sevilla, 5, 6 y 7 de abril de 1989.* Sevilla: AESLA, pp. 375-388.

PARKHURST, C. (1990). "The composition process of science writers." *English for Specific Purposes* 9: 169-179.

PIQUÉ, J., and N. ESTÉVEZ (1991). "Syllabus planning in English for the health sciences." In: M. McGINITY *ET AL.* [eds.] (1991). *Lenguas Aplicadas a las Ciencias y la Tecnología.* Badajoz. Universidad de Extremadura and Universidade de Évora, pp. 124-135.

POSTEGUILLO, S. (1996). *Genre Analysis in English for Computer Science.* València: Universitat de València, Servei de Publicacions, Col·lecció "Tesis Doctorals en Microfitxes".

RATNOFF, O. D. (1981). "How to read a paper." In: K. S. WARREN [ed.]. *Coping with the Biomedical Literature.* New York: Praeger, pp. 95-101.

RICHARDS, R. (1988). "Thesis/dissertation writing for EFL students: An ESP course design." *English for Specific Purposes* 7: 171-180.

ROBINNETT, B. W. (1978). *Teaching English to Speakers of Other Languages.* Minneapolis: University of Minnesota Press.

ROBINSON, P. C. [ed.] (1988). *Academic Writing: Process and Product.* London: Modern English Publications. ELT Documents 129.

RUBIN, D. L., R. GOODRUM and B. HALL (1990). "Orality, oral-based culture, and the academic writing of ESL learners." *Issues in Applied Linguistics* 1/1: 56-76.

SALAGER-MEYER, F. (1992). "A text-type and move analysis study of verb tense and modality distribution in medical English abstracts." *English for Specific Purposes* 11: 93-113.

(1993). "Imprecision and vagueness (hedging) in today's medical discourse: courtesy, coyness, or necessity?" *the ESPecialist* 14/1: 1-15.

SILVA, T. (1990). "Second language composition instruction: developments, issues, and directions in ESL." In: KROLL, 1990, pp. 11-23.

SINGH, R. K., and M. DE SARKAR (1993): "Writing subject-specific composition: A report on peer-interactional feedback." *Unesco ALSED-LSP Newsletter* 15/2: 19-37.

SMITH, F. (1982) . *Writing and the Writer.* London: Heinemann Educational.

ST JOHN, M. J. (1987). "Writing processes of Spanish scientists publishing in English." *English for Specific Purposes* 6: 113-120.

SWALES, J. M. (1981). *Aspects of Article Introductions.* Aston Research Report, No. 1. University of Aston.

(1987). "Utilizing the literatures in teaching the research paper." *TESOL Quarterly* 21: 41-68.

— (1990). *Genre Analysis. English in Academic and Research Settings.* Cambridge: Cambridge University Press.

THOMAS, S., and T. P. HAWES (1994). "Reporting verbs in medical journal articles." *English for Specific Purposes* 13: 129-148.

THOMPSON, G., and Y. Y. YE (1991). "Evaluation in the reporting verbs used in academic papers." *Applied Linguistics* 12: 365-382.

WEBBER, P. (1993). "Writing Medical Articles—A discussion on common errors made by L2 authors and some particular features of medical discourse." *Unesco ALSED-LSP Newsletter* 15/2: 38-48.

WHITE, R. (1988). "Academic writing: Process and product." In: ROBINSON, 1988, pp. 4-16.

WINDSOR, D. A. (1990). "Engineering writing/writing engineering." *College Composition and Communication* 41: 58-70.