BRIDGING THE GAP IN SCIENTIFIC ARTICLES

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ABSTRACT

Scientific article introductions are probably one of the most complex sections to write, as pointed out by the literature. Their complexity stems from the variety of moves and steps. One of these moves, referring to previous research, offers the readership certain limitations that the author tries to bridge. The transition from this move to filling this gap involves not only furthering and/or replicating present day research, but also a concern to enhance and improve published investigation. This article aims precisely at analyzing ways in which authors approach this transition within their article introductions. Twenty Health Science articles were selected to pinpoint differences from a structural viewpoint according to sub-specialisms. Our results showed that their authors' concern was basically aimed at the message conveyed rather than at an established structural canon. Thus, the presence of different steps in their introductions differs considerably, although not as much as in terms of moves.

0. INTRODUCTION

Present research is still debating whether the area of study covered by Languages for Specific Purposes (LSP) belongs to an independent academic field. This could perhaps be attributed —as Tarantino (1995: 31) has rightly observed— to three so-called sub-areas which are mingled in most LSP studies: a theoretical approach; a pedagogical concern by most language teachers; and finally a professional approach derived from an occupational and instrumental outlook on the language. These last two sub-areas are clearly distinguishable in terms of their application: pedagogical, because most of the research in that area derives from teaching experiences undergone in class, and professional, because it deals with the language in the different fields of their work. What seems to be the origin and cause of disagreement among scholars is whether its theoretical framework justifies the methods used by LSP practitioners, and gives it the corresponding academic status. According to Markee (1993: 264-265), however, the arguments have not been convincing. It is, therefore, important

to thrive towards what Tarantino (1995: 50) describes as «the blending of communication and language education theories and practices» in an effort to «narrow the gap between the status of this research area [i.e. ESP/LSP] and that of literary-bound studies.»

The study of genre –especially as it refers to register– has long been a part of linguistics, notably since Halliday and the systemicists published their works. However, it was not until Swales' (1981) study on article introductions, and more recently with his 1990 monograph, that genre analysis became important in the field of LSP research. However, as Fairclough (1992) pointed out, Swales' notion of discourse community needs to be redefined in terms of differentiating audience and community, since these communities are not «static synchronic entities [but] shaped and transformed» (Fairclough, 1992: 48), and they are subject to what Fairclough calls «contestation and struggle» as their fundamental processes. Thus, aside from the Sydney School concept of genre (Reid, 1987), most scholars would rather link research literature to changes in scientific knowledge (Freedman & Medway, 1994b: 9).

1. THEORETICAL FRAMEWORK

Several theoretical perspectives can be adopted when studying a text thoroughly and systematically. From an approach based on text structure, by Dudley-Evans (1989) and Swales (1990), to Bazerman's (1994) idea of writing as a social reality, complemented with Schryer's (1994) idea of competition among professionals, Nwogu (1997) draws his own conclusions based on Swales' work on Research Articles (RAs). We will pursue the study of a series of texts with the view that they are a combination of social, structural and linguistic entities. We will pursue the study of a series of texts with the view that they represent a social reality which are expressed through a set of norms to convey the author's message.

Bazerman (1994: 79), taking as the object of research the patents, in which a highly competitive world is involved, claims that writing is a form of social action, since texts are not static and represent a social reality. In addition, Bazerman's idea can be complemented with Schryer's (1994) study in which she attempts to unite research and practice from voices articulated by professionals in Medicine and Engineering. Basically her conclusion is that genres not only are stabilized sites of social action but also contribute to coordinate the work of groups and organizations (Schryer, 1994: 122). We want to look at texts precisely as representative of this coordination among the members of a specific group in any given organization.

Another perspective of analysis is outlined by Dudley-Evans' (1989), in which, as part of a framework to approach a set of texts, he suggests the following scheme:

a) group together certain texts that have important similarities in terms of rhetorical purpose, form and audience;

b) show how these texts are distinct from other texts; how they differ between themselves and how they differ from other text types;

c) provide information about the rhetorical structure and linguistic form of different types of text that is of pedagogic value. (Dudley-Evans, 1989: 72)

These similarities may be shown as patterns used by different groups associated with various specialisms; patterns such as problem-solution, matching, repetition, contrast and compatibility; or general-particular. However, authors have suggested that this oversimplified approach is not enough to discover both the internal text structure and the linguistic form as well as its external rhetorical structure.

For years, the problem-solution paradigm was one of the macro-structures referred to by most authors, especially Winter (1977), Zappen (1983), Hoey (1983), as well as Stanley's (1984) pilot study, in which this macro-structure is applied. Through this model, the surface linguistic study and local levels of text analysis with the overall surface of the text are combined. According to Hoey (1983), a given text consists of the following elements: *Situation, Problem, Solution or Response,* as well as *Result and Evaluation.*

Our concern here is with the second of these elements, the 'problem,' and its transition into the 'solution.' Its global identification seems to present no major difficulty, but authors take a different approach in regard to the process. They point out that it can usually be identified with an adversative sentence-connector, which is a signal used as an opener, such as *however, nevertheless, yet, unfortunately, nonetheless, but,* and others. Dudley-Evans (1989: 72), however, thinks that this approach is too simplistic since it does not answer all the questions posed by the system of analysis he proposes. Thus he suggests a systematic approach to texts, such as the one undertaken by Swales (1981), by which he showed how each type of text differed from other kinds of texts.

After studying 48 introductions from different academic disciplines, Swales (1981) concluded that there was a structure for these introductions in which a series of 'moves'[1] occurred in a predictable order. David Hall and colleagues

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1 The term 'move' has appeared in discourse analysis connected with classroom interaction (Sinclair and Coulthard, 1975), as well as for the analysis of conversations in reference to different speech acts (Edmondson, 1981), and also in reference to genre analysis, specifically to determine the information structure in article introductions (Swales, 1981).
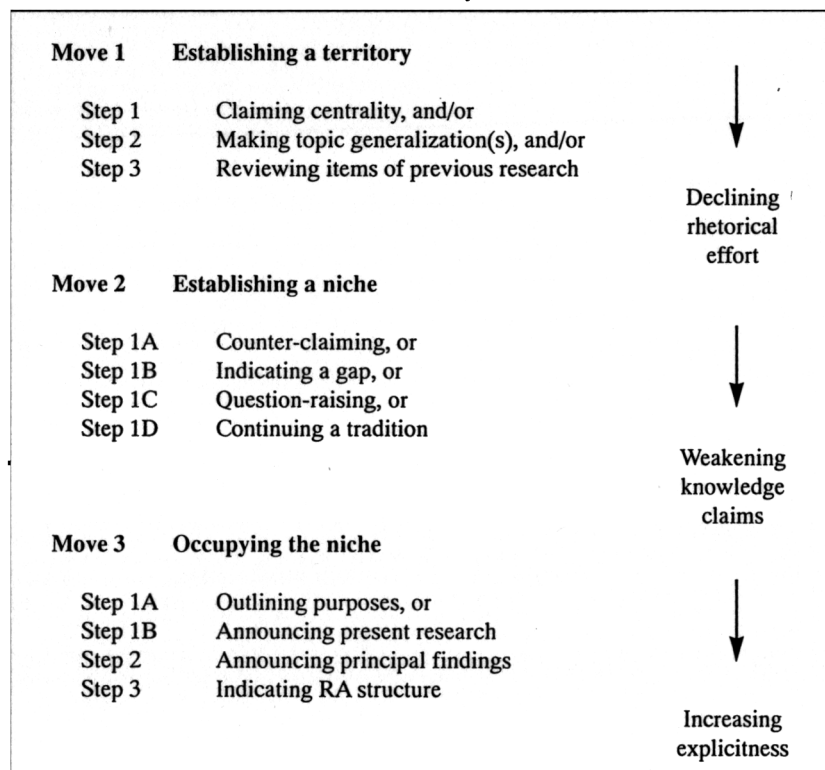
(1986: 152-153) point out that Swales, from his early research (1981 and 1984), first delineated a four-move pattern which could be outlined as follows:

RE   *The Four-Move Pattern*

Move 1. Establish the field.
Move 2. Describe previous research.
Move 3. Indicate the «gap» in previous research.
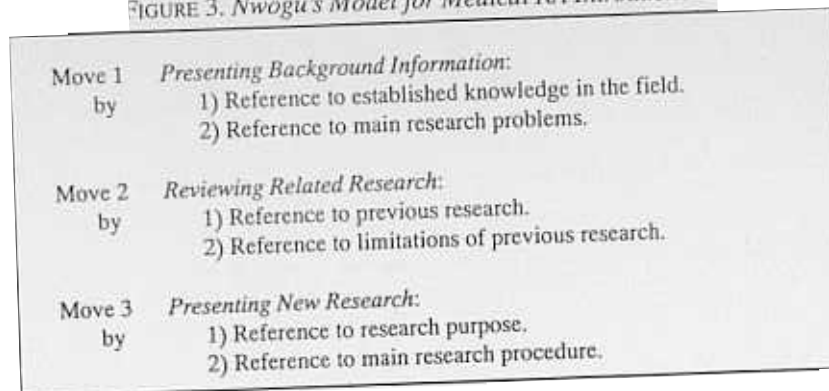Move 4. Announce the present research.

In 1990, Swales further elaborated on his own research, offering a revised macro-structure, known as the CARS model (*Create a Research Space*), which reduced the number of moves to three, although subdividing each one into individual and distinct steps (Swales, 1990: 141):

FIGURE 2. *Swales' CARS Model for Article Introductions*

Move 1	Establishing a territory	
Step 1	Claiming centrality, and/or	
Step 2	Making topic generalization(s), and/or	
Step 3	Reviewing items of previous research	
		Declining rhetorical effort
Move 2	Establishing a niche	
Step 1A	Counter-claiming, or	
Step 1B	Indicating a gap, or	
Step 1C	Question-raising, or	
Step 1D	Continuing a tradition	
		Weakening knowledge claims
Move 3	Occupying the niche	
Step 1A	Outlining purposes, or	
Step 1B	Announcing present research	
Step 2	Announcing principal findings	
Step 3	Indicating RA structure	
		Increasing explicitness

In a recent paper, Nwogu (1997) also looks into the constituent elements of RAs from a selection of fifteen Medical texts containing the traditional IMRD sections. Following the move-and-step schema identified by Swales (1990), Nwogu (1997: 135) proposes three introductory moves. As shown in Figure 3, the respective label of each move indicates the units of information contained therein.

FIGURE 3. *Nwogu's Model for Medical RA Introductions*

Move 1 by	*Presenting Background Information:* 1) Reference to established knowledge in the field. 2) Reference to main research problems.
Move 2 by	*Reviewing Related Research:* 1) Reference to previous research. 2) Reference to limitations of previous research.
Move 3 by	*Presenting New Research:* 1) Reference to research purpose. 2) Reference to main research procedure.

For the purpose of this paper, we will concentrate specifically on the transition from move 2 (Nwogu's *Reviewing Related Research*, with special reference to sub-move 2) to move 3 (*Presenting New Research*, particularly sub-move 1).

As can be seen in the corpus we selected, as well as our interpretation of the different moves and sub-moves, our research reflects Nwogu's schema more than Swales' moves and steps. In addition, our teaching experience shows that a more schematic and simpler approach to the structure of introductions –such a more schematic and simpler approach to the structure of introductions –such as the four-move model (Figure 1) or Nwogu's schematic three-move approach (Figure 3)– has proven to be more helpful in the student's understanding than the information to be included in the introduction of a scientific article which can be structured very consciously by its author.

2. ANALYSIS OF CORPUS AND RESULTS

We approached our corpus of 20 research article introductions (12 on Medicine, and 8 on Nursing) from the point of view of their structure trying to pinpoint some possible differences in approach according to different authors

and their sub-specialisms in Health Science texts. The size of the 20 texts studied varied considerably (see Figure 4), ranging from 199 [Med-19] to 1823 words [Nurs-7]. This disparity in size, however, responds to the type of article (in addition to [Nurs-7], see also [Nurs-5], with 1582 words; although the third essay in size is a much shorter text, [Nurs-6], with 891 words) in which the introduction takes the characteristics of a state-of-the-art RA whereby the author gives an ample overview of the discipline in question. Nevertheless, the average size remains quite low with 612.05 words per text (total number of words of the corpus, 12,241).

FIGURE 4. *Corpus Distribution by Number of Words*
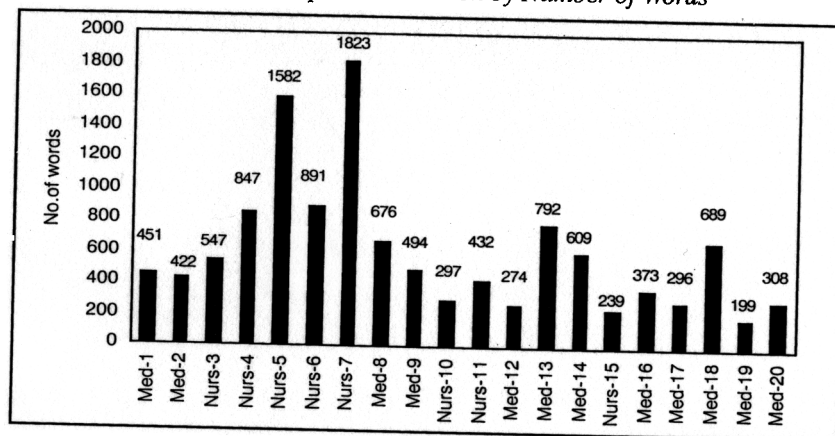
Structurally, the transition from move 2 (sub-moves 1 and 2) into move 3 (sub-move 1) appears to be quite similar and present in most of the papers in our corpus. Some differences, however, can be observed. The 'bridging a gap' paradigm takes different forms, especially in regard to the type of research undertaken. Thus, the specialism or sub-specialism will often determine the general structure of the introduction, especially in Nursing studies. Although introductions usually follow Swales' CARS model outlined above, it is not a systematic recurrence, especially in nursing texts. Here we would agree with Swales (1990: 145), in regard to one specific introduction taken in its entirety: «My reading of the introduction as a whole suggests that the unusual order may be relatable to the authors' concern to establish early that their study was based on very extensive field work.» The verbalization of this field work, however, takes different forms by which authors can defend their decision to base a concrete RA on a specific problem.

1. Some article introductions present a real gap in the research by claiming that previous investigation has forced their authors to pursue and deepen into some specific problem, due to lack of clarity, or simply because the findings are interpreted as unsatisfactory. For example, in an experimental study on hypertension based on 51 Wistar rats, the move is expressed in terms of a re-discovered research problem:

> These recent findings ... have newly stirred up questions as to the possible long-term mechanisms by which a stimulated brain renin-angiotensin system could contribute to genetic hypertension. [Med-1]

Also because previous research, or a simple statement, may need what the author of a paper calls

> further development or refinement. [Nurs-4]

Conflicting findings and possible limitations have also prompted further research –for example, the highly competitive world that we pointed out earlier–, as well as problems in the methodology employed, as shown in the following text from a study on 54 elderly nursing home residents:

> Studies have been conducted to test the effectiveness of reminiscing as a therapy have yielded conflicting findings ... Many of the studies have had methodological problems or conditions that limited the effects that might have been achieved. [Nurs-3]

Problem identification in their daily practice also prompts the authors' work:

> However, nurses have identified problems when dealing with these patients in their homes. [Nurs-10]

As a result of these problems, the author concludes her introduction, before expressing the purpose of the research:

> In view of the conflicting findings and limitations of these studies, there remain unanswered questions regarding the benefits of reminiscing as an interventive technique for the elderly. [Nurs-3]

This conflicting evidence is further asserted in a Medical paper in which its authors speak of previous research on cardiac problems in the elderly:

> A small number of studies have included some form of assessment of BRS in the elderly, and the evidence from these is somewhat conflicting. [Med-9]

They suggest a solution that should be primarily based on clarifying that evidence:

Our primary purpose in the present study was therefore to clarify the evidence regarding arterial BRS in hypertension in elderly subjects but also to address the special case of isolated systolic hypertension, which represents a majority of all hypertension in the elderly. [Med-9]

2. In a second set of RAs, the authors resort to substantially different reasons for research in terms of a specific sub-specialism within Health Sciences. In other words, they tend to look mostly at the use or non-use of certain health practices which are conducive to better health. Their struggle, therefore, is not with other researchers but with the community 'group' they serve. A typical example is a Nursing paper on breast self-examination in which the author reflects upon an activity which, she claims, should be a common and routine practice among women, and deplores that it is not so:

> Unfortunately, breast self-examination is not widespread. [Nurs-6]

She then goes on to say:

> This fact partially explains why breast cancer mortality rates have not declined. [Nurs-6]

Just as this outlook is mostly present in Nursing literature, we also find a similar approach in Medical texts, particularly in epidemiological studies, as shown in the following example:

> Lack of compliance with medications has long been identified as the major barrier to blood pressure (BP) control in the population. [Med-20]

Next, the authors pinpoint problem areas they are aware of, due to both previous research and their critical outlook on it, and subsequently end up with a number of recommendations to pursue and justify their own RA.

In other RAs, authors aim at discussing the mechanics of Medicine and focus on the failure of a specific manual treatment, usually through surgery. In an article that would not fit into the typical IMRD structure of a Health Science RA, its authors claim throughout that

> Local recurrence following breast-conserving surgery for breast cancer is a significant failure of local treatment. [Med-12]

They then specify seven failures and the psychological problems associated with this type of surgery, some of them because

the constraints of informed consent resulted in poor patient accrual. ... However, highly significant differences in the incidence of local recurrence were observed in all these trials. [Med-12]

Furthermore, they bridge this significant gap in the research by reviewing today's most common practices:

> In the present article the problem of local recurrence following breast-conserving surgery, its mechanisms, risk factors and relationship to distant disease and overall survival are reviewed. [Med-12]

3. Another group of RAs is aimed at emphasizing either the paucity of research or a total absence of it in reference to a given health problem. After complaining that very few studies have been published connecting cigarette smoking and angina pectoris in women, the author singles one out with these words:

> No other study can compare with it. [Med-17]

He subsequently relies on a descriptive metaphor to say that his paper aims precisely at repairing this 'deficiency':

> The purpose of this report is to repair this deficiency   by presenting a comprehensive view of data and results ... [Med-17]

In another sample we read:

> ... relatively little research on the effectiveness of these techniques has been reported. [Nurs-5]

4. A final group of papers would address a type of a 'knowledge deficit' in the exercise of the profession, although related to certain specific areas of care. This is particularly true in the Nursing profession, perhaps due to the fact that it has taken so long for this group of health workers not only to emerge as a recognized profession in the strictest sense of the word but also to establish the principles and characteristics necessary to consider Nursing as a science.

We have detected several RAs in which it seems that the authors' main concern is establishing the nurse's place in the health team. For instance, in three Nursing papers we find expressions such as:

> Nursing care to promote comfort and alleviate pain has long been of central concern to nursing. [Nurs-5]

The nurse's role was described as an important link in facilitating communication between the patient, the health team, and the family. [Nurs-7]

Nurses have been at the forefront of caring for the chronically mentally ill elderly in their homes. They have recognized that the complex needs of these patients require a multidimensional approach ... Nurse researchers have determined that functional assessment enhances our clinical expertise, which in turn improves the quality of patient care. [Nurs-10]

However, this close involvement in patient care also makes the authors aware of areas in which questions arise, as a result of a possible knowledge deficit, and writers set out to answer them. As pointed out in one of the essays,

nursing knowledge is an important precursor to decision making. [Nurs-7]

This can also be seen in the following example in which the authors further dwell on such questions and the need to answer them:

Although nurses obviously make numerous decisions regarding pain, there are many questions related to decision making and pain to be answered. [Nurs-7]

Regarding pain management and assessment, one author recalls previous research in which more thorough work is required by the Nursing personnel:

Even though it has been suggested that it may be inappropriate to attempt to measure all aspects of pain in one assessment, Donovan clearly emphasizes the need for thoroughness and efficiency in nursing assessment of pain. [Nurs-4]

Additionally, in reference to Nursing care, knowledge deficit is also pointed out and so is the need to address it:

the substantive knowledge base about that care and how effective it is remains extremely limited. [Nurs-5]

Frequently, ethical issues, brought up in regard to clinical decision making among health professionals whenever complicated choices are required, are often used as the main reason for further research. As pointed out in one of the Nursing papers, situations such as these and subsequent research provide a basis for the authors' study:

Ethical conflicts result when decisions made create conflicts about the morally ight action and duties and obligations of health care professionals. [Nurs-7]

Through these examples we can point out that authors in the health sciences are rather haphazard in following a set structure within RA introductions, especially in terms of conceptualizing the different introductory moves and how they express their bridging a gap. The majority of essays, however, would include moves that respond to Swales' (1990) CARS model. In all of the samples, except in [Nurs-15] (which only includes move 2), we have found the presence of the three moves, with more or less success as far as move content is concerned. Significantly, Nwogu's (1997: 124) research showed that moves 2 and 3 occurred in all the fifteen texts in his corpus, while move 1 was present only in seven of the total number of articles.

The lack of uniformity is evidenced in several essays from our corpus: in the introductory paragraphs of one paper [Med-18], its authors do not distinguish move 1 from move 2, and they mix the two moves as they write the introduction. Move 3 is very short and confusing, with a simple expression «the intent of this paper» in the middle, and with expressions such as «we will show,» «we will demonstrate,» etc. (mingled with move 1 material), at the end of the move.

In another paper [Nurs-7], the authors present a multiple-structured introduction in which, from a simple move-1-2-3 scheme, they proceed to double it in a longer replication of moves. A description of the order of moves would resemble the following structure: 1, 3, 1, 1, 3, 2.1, 2.2, 3. Although it is not a perfect example of the cyclicity mentioned by Swales (1990: 159), it is nevertheless closely related; through this structure the authors have attempted to create their 'research space.' Nevertheless, another sample of our corpus [Nurs-15] has room for only one move in which the author expresses his concern, and the concern of public organizations such as the WHO, for pain management and the attitudes of nurses towards it, in terms of the classic *status quaestionis*, or a typical state-of-the-art introductory paragraph.

The authors of paper [Med-19], for instance, end their introduction with two direct questions (move 3 content), which exemplifies their way of bridging the gap. Although short in the number of words (199), one can clearly separate the three main moves of this sample introduction. Additionally, in another sample [Med-16], more in line with RAs related to the so-called Hard Sciences, the authors limit their move 1 to an 18-word sentence as a statement of fact; move 2 is also quite simple and has no direct references to individual authors; in move 3, however, the authors use direct personalized sentences

that go straight to the point: 'we categorize,' 'we will use,' 'we argue,' 'we will also show,' 'we develop,' 'we begin.'

Taking a quantitative outlook on our corpus, however, the word content in each move fluctuates throughout the essays analyzed. Although it is often difficult to ascertain whether a sentence belongs to one move or another, our analysis would indicate that most Medical essays concentrate on move 2, i.e. reviewing previous research and its limitations, as in [Med-1], [Med-2], [Med-8], [Med-9], [Med-12], [Med-13], [Med-17] and [Med-20], with a total of 46.84 % of the words (see Figure 5). One of the samples, [Med-12], is especially noteworthy, since 85% of the text is dedicated to that same move 2. In contrast, the three moves are almost evenly distributed in [Med-14], while in [Med-16] and [Med-18], moves 3 and 1, respectively, differ considerably from the trend shown in the rest of essays.

FIGURE 5. *Percentage Distribution of Moves in Medical RA Introductions*
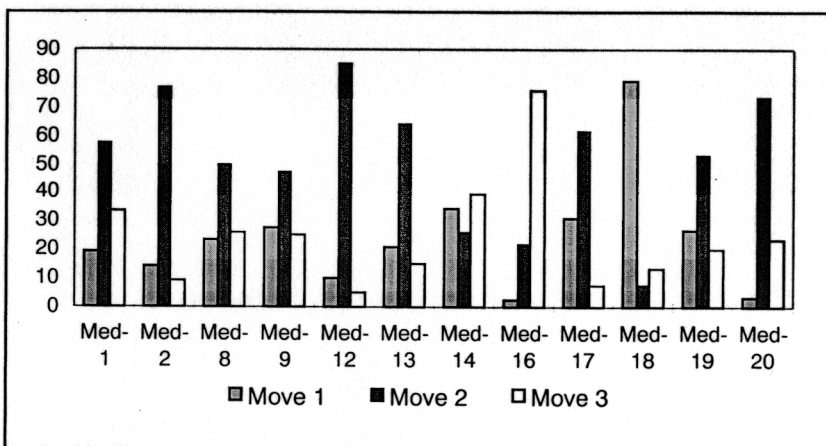
Similar observations can be made in reference to the Nursing-related essays. Aside from samples [Nurs-4], [Nurs-7] and [Nurs-11], with predominance of words in move 1 (53.81 % in move 1 versus 46.19 % in both moves 2 and 3), the rest of samples also seem to concentrate on move 2 which, in some way, is a preview of the need for justification of the authors' own research (see Figure 6 for their percentage distribution). As pointed out earlier, [Nurs-15] presents a short introduction in which Pritchard uses the 239 words of move 2 to emphasize previous research carried out by Drs. Swedlow and Stjernsward. In addition, the authors of [Nurs-5] also accumulate most text in move 2 (81.31%).

FIGURE 6. *Percentage Distribution of Moves in RA Introductions by Nursing Authors*
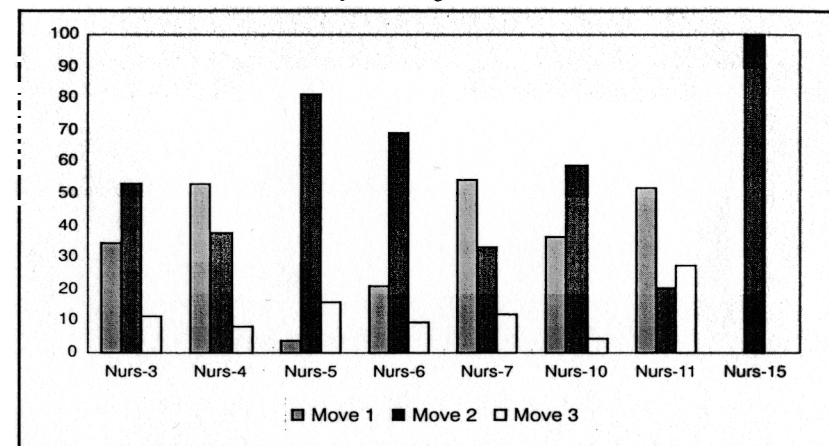
Variability and freedom in the expression of moves emphasize the difference between Medical and Nursing introductions. Move fluctuation, especially in the Nursing profession, is needed to establish its own status within Health Sciences. The consistency of move 2 content in Medical essay introductions is an indication of the over-abundance of research in their field.

3. DISCUSSION

As we have already pointed out, in considering the corpus we have selected, the size of the different texts responds to the essay characteristics in question. However, we feel there is more to it than just that, since it is still being debated whether Nursing is, in Etzioni's (1969: xii) words, «a full-fledged profession,» and not simply an appendix of Medicine.[2] Thus, Nursing professionals often occupy some space in their introductions to cover an area still not well known among their colleagues, and among a possible readership often in disagreement with their conclusions; while most of the papers related to Medicine find their area of specialism well-plowed and fertilized, ready for new information on

2 See R. Camaño-Puig, in his doctoral dissertation entitled «Nursing Professionalisation in England and Spain: A Comparative Study» (Leeds Metropolitan University, 1997), for an enlightening description of this issue.

very concrete and specific instances of research. In addition, in Medical RAs more quantitative research can be found, while in Nursing, writers focus more on qualitative features of their research. However, this should not be considered in terms of the well-known aphorism, «quality better than quantity», but rather from the point of view that writers of Nursing texts feel the need to use self-explanation and, consequently, justification of their research.

Swales (1990: 145) stressed the «authors' concern to establish early that their study was based on very extensive field work.» We would even go further by saying that, in regard to RA structural and textual perspectives, their concern is basically to adjust it to the message, rather than to an established canon –or a set of style norms and regulations– when considering a specific rhetorical patterning. Whether they use a set macro-structure or not, has directly to do with the internal message; and the moves and sub-moves or steps included will depend on the RA's internal needs. Thus, we think it is reasonable to say that there is no one way in which a Health Science essay must be written, and from the corpus we have selected, their introductions will differ considerably in terms of steps, using Swales' terminology, although not as much as in terms of moves. This inconsistent structure is documented in RAs by essays [Nurs-7], [Med-18], etc., mentioned above.

The transition from move 1 to move 2, as we have emphasized, is multi-faceted. But an ample description of current research on the topic predominates, followed by an expression of aim and scope of the RA, most often expressed in impersonal terms: 'The purpose of this study/paper/report ... '[Nurs-3], [Nurs-6], [Nurs-7], [Nurs-10], [Nurs-11], [Med-17]; 'This study explored ... '[Nurs-4]; 'This study utilized ... [Nurs-7];' This paper reports on data ...' [Med-8], etc. The length of these moves is related to the aim and objective of the author and the audience he/she has in mind when writing the paper. Thus, some of the differences observed will probably have a direct bearing on the field it refers to, often justifying the professional's inherent right to act (to diagnose, cure, treat, etc.), as if they were reacting against another well-established –i.e. fossilized– group of professionals who are not too prone to accept new trends and needs in society, and thus in the health system.

It is, therefore, reasonable that most of the research done in this area has pointed to conflicting issues which need to be clarified or solved both in the literature and the daily practice work of caregivers ([Nurs-3] and [Nurs-10]), e.g. their possible ethical conflicts [Nurs-7], the knowledge gap to be filled [Nurs-5] and the numerous questions about decision making to be answered [Nurs-7]. Medical texts, however, tend to be more direct and to the point (for instance, [Med-9], [Med-12], [Med-17] and [Med-20]). Our research, however, has brought us closer to Bazerman's (1994) idea that writing often resembles a form of social action, not only between professionals in their writing activities but also between professionals in their struggle to ascertain and achieve a true professional role in society.[1]

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Analyses of academic English
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