Abstract

Students undertaking research degrees, particularly PhD degrees, are expected to write and publish refereed journal articles. Students from non English-speaking backgrounds and cultures (NESBC) can find this process particularly difficult. Students become familiar with the genre of the research article through reading the journals. However, as novice research writers, they need mentoring through the process of writing a journal article in their specialised area by supervisors who are familiar with the rhetorical conventions of the genre in the particular field. Experienced supervisors, who have published, have an intuitive grasp of the structure of the research article, and are able to suggest restructuring of unsuccessful drafts. The process by which the supervisor's implicit knowledge is made explicit, i.e., how an academic supervisor analyses and revises the structure of a student's draft article, has not been widely studied. Second language research, most notably Swales, has analysed the explicit product of this implicit understanding, i.e. published articles. A think-aloud protocol was used to record the supervisor's revision of an NESBC student's draft journal article. The revised paper was analysed to see whether Swales' 'moves' were present and the recorded text was analysed to see how and why the supervisor rearranged the draft. This paper is collaboration between an engineer and an applied linguist. It describes the process of re-organisation process of a professional journal article which an NESBC postgraduate student and his supervisor went through to arrive at format suitable for publication.

Introduction

"We have read your manuscript with boundless delight. If we were to publish your paper, it would be impossible for us to publish any work of lower standard. And as it is unthinkable that in the next thousand years we shall see its equal, we are, to our regret, compelled to return your divine composition, and to beg you a thousand times to overlook our short sight and timidity"


Postgraduate research students, particularly those in the pure and applied sciences, are encouraged and even expected to
write journal research articles (RAs) as a part of the PhD process. Swales (1984 p79) describes publishing RAs as one the academic "rites of passage" in a professional career. However, writing an RA is not an easy task for novice researchers, who begin their study as outsiders in the academic community (Gosden, 1995), unfamiliar with the "rules of the game" (Gosden, 1995 p39) of academic research. It can be particularly difficult for students from non English-speaking backgrounds and cultures (NESBC). Such students are doubly outsiders, since they must deal with both "apprenticeship as novices in their fields of academic research" and the "challenge of a new genre" (Gosden, 1995 p39). Although NESBC students may be familiar with the genre of the RA through their content reading, when they must reproduce written instances of this genre themselves, they often experience enormous difficulties.

For supervisors of postgraduate students, if work from a thesis has already been published in a refereed journal before it is submitted for examination, the examiners know that the research has been approved by the expert peer community. They can thus have increased confidence in the credibility of the research, and the thesis has a greater chance of being passed (Swinburne University of Technology, 1998). The interaction between the supervisor (SV) and the postgraduate student (PG) is of prime importance in the successful completion of a postgraduate degree and resultant RAs arising from the thesis.

This paper describes the methodology one supervisor and one NESBC research student went through together as they restructured the student's draft journal article into a suitable form for publication. The work presented here is from the perspective of the supervisor, and concentrates on the revision of the Introduction section to the article. The Introduction is chosen as it is a section which causes NESBC students great difficulty (Clerehan and Moodie, 1997) and because it was the section which needed the most revision.

Using a form of 'think-aloud' narrative, the paper documents the supervisor's mental processes; why and what changes were suggested, and how the student was mentored through them. This is our way of "Making explicit what people know about effective texts" (Gosden, 1995 p37). It is also, an addition to analyses in this field, "...we still need micro-level analyses of how such processes learning the discipline's rhetoric work in science .. and what makes them more or less effective" (Blakeslee, 1997).

Background

"what you did, why, what you found out and what you interpret from this"

When writing a research article, NESBC postgraduate students are confronted by two major problems: the first, is the need to achieve mastery of "the rhetorical manipulation of discourse explaining "what you did, why, what you found out and what you interpret from this" (Gosden, 1992 p132). Bhatia and Canagarajah (1996) have consistently argued that non English-speaking researchers have great difficulty in having RAs accepted by the English native-speaking academic discourse community because, no matter how rigorous their science, their lack of mastery of the genre conventions, and thus their lack of power in the discourse, excludes their work from the journals.

The second problem is the requirement to produce a text that is recognised and accepted as an appropriate example of the genre of the RA by members of the academic discourse community. These expert members will recognise an instance of a genre if it fits with the shared "communicative purposes" (Swales, 1990a, p58). That is. if it is '...a recognisable communicative event characterized by a set of communicative purpose(s) identified and mutually understood by the members of the professional community in which it regularly occurs' (Bhatia, 1993, p13). Bhatia adds that a recognisable genre (in this case the RA) is "most often ... highly structured and conventionalized with constraints on allowable contributions in terms of their intent, positioning, form and functional value" (p13).

If NESBC students wish to write an RA recognised by the academic discourse community, they must somehow learn to write within the structures, conventions and constraints of this community. Expert members' of the community, i.e., research supervisors, are the ideal mentors in this learning process; "active discourse community members tend to have the greatest genre-specific expertise" (Swales, 1990a, p55). If the supervisor does not act as an active and responsive academic 'mentor', the NESBC research student finds great difficulty in having an RA accepted, and also has little opportunity to learn what the 'accepted' RA genre of the discourse community is. Belcher (1994 p24) suggests that mentoring in "the cognitive apprenticeship model" has limitations. Certainly, not all academics can "provide the needed scaffolding for the apprentice" or "coach and model" (p 24), and not all students wish to become part of the discourse community. However, some students do, and some supervisors can provide the coaching and modelling necessary.

A Personal approach to the Analysis

"to learn, from the horse's mouth"
It is frustrating to try to unravel what happens in someone else's mind. It is particularly frustrating for an applied linguist (AL) to try to deconstruct the thinking of a supervisor from a different discipline, and for an NESBC student and a native speaker (NS) supervisor to decode each other's mental processes. When we first had the idea for this paper, AL, as the NS 'outsider', the non-engineer, saw this as an excellent chance to learn, from the NS horse's mouth as it were, what exactly were the "implicitly shared goals and discourse conventions" (Godsen, 1995 p39) of this science genre; i.e., what happens. AL also saw this as a valuable research opportunity to document the process as a written paper and so pass on the 'how to' to the NESBC postgraduate engineers with whom AL works in the Swinburne Intercultural Academic Bridging Program. These students have spoken often of their frustration when grappling with spoken and written English in order to describe research, knowing they have expert knowledge as scientists, but not as English speakers. This was a chance to demystify the process.

The RA in question was based on work undertaken for a research Masters degree by an NESBC engineer from Indonesia (PG). He is an experienced engineer, the manager of the factory where he works in Indonesia, and his thesis is an exciting piece of new research on microwave bonding techniques (to quote his supervisors).

The AL was involved with SV and PG on the language and structure of the thesis. The three of them had worked through a number of drafts, over many hours, and so were familiar with PG's use of language, and with some of the linguistic difficulties he had when writing the thesis. These were to do with the variables of the context of situation of his text, i.e., writing a particular type of academic text in a particular format for a particular audience with particular expectations of what would be included and how it would be structured and presented.

There are 'three parameters of the context of situation ... which reflect the three main functions of language' (Butt et al, 1998, p 13). These are the Ideational, Interpersonal and Textual metafunctions (see Halliday, 1994; Eggins, 1994; Butt, Fahey et al, 1998 and Gerot and Wignell, 1995 for interpretations of Systemic Functional Theory). These three interconnected levels of language are also defined, more simply, as Field, Tenor and Mode. Field is what the text is about; Tenor is the relationship between writer or speaker and the audience; Mode is the 'organization of the text' (Halliday, 1994, p 179). PG's text had difficulties in all of these areas, particularly in the areas of Tenor, with PG's assumptions about what and how much information should be included and, to a lesser extent, in the area of Mode, with the language structure being used. SV does not use the metalanguage of a linguist, and the AL did not use the terminology of his, but by talking through his revision of the paper, and discovering why he suggested certain changes, they both found that they meant the same thing, though they used different discourses.

**Modes of Analysis**

"four moves have become three"

Swales' (1984, 1990a, 1990b) analyses of research article introductions are perhaps the best known in the field of second language research. Swales originally described a "predominating structure" of four 'moves' in RA introductions (1984, p80). Swales and Feak (1994, p175) provide a modified version of these moves, the so called CARS model (Create-A-Research-Space), in which the four moves have become three, each containing a number of obligatory or optional sub-moves:

Move 1, Establishing a research territory (sub-moves, establishing centrality of research or reviewing previous research); Move 2, Establishing a niche (sub-move, indicating the 'gap' in or questioning or expanding on previous research); Move 3, Occupying the niche (sub-moves, stating the purpose of the paper, outlining the main research findings or outlining the RA structure). We take Swales CARS model as typical of RA introductions because its frequent use "indicates that this strategy is at least tacitly perceived as effective for introducing new ideas" (Paul and Chorney, 1995).

The postgraduate student wrote a draft of the RA and gave it to the supervisor on disk. SV read it, and then he and PG sat down together at the computer and PG rewrote it while they talked through it. The first draft submitted to the supervisor was the final version produced by PG. When SV and AL sat together and recorded SV's comments talking through the revisions he had made on that first draft, and had the second version in front of them on paper. SV was able to recall in detail the revisions he had suggested to the first draft. Using the second draft, it was noted where PG had made some structural and thematic changes following SV's suggestions. Other suggested revisions he had decided he did not like, and no changes had been made.

We worked from the premise that Swales' model was the structure which would emerge in the finished article. Supervisors who have published in the journals can automatically produce a form of the CARS model when they write an RA. When PG wrote his first draft, however, it was very different from the CARS model.

The text of the draft of the Introduction to the RA, as PG wrote it, is produced below.
"1. Introduction

The use of variable frequency microwave (VFM) oven for material processing has been recently recognized and utilized by a few material researchers in the world as an emerging new microwave heating technique, in light of improving the use of 2.45 GHz fixed frequency single mode microwave heating units. VFM ovens offers significant advantages over the successfully widely used fixed frequency single mode microwave unit because for instance, it gives uniform electric field distribution in the microwave oven cavity and fully controllable operation heating system. VFM oven has been designed and developed jointly by Lambda Technology Inc, a company specializing in the scale up of microwave energy equipment and Oak Ridge national Laboratory, Department of Energy, USA, which aims to improve heating uniformity problems of microwave heating and the limitation of scale up commonly encountered by the use of single mode microwaves units. This relatively new technology had been employed for advanced materials processing: polymerization, composite processing, ceramics sintering, bonding, and analytical applications, covering high and low temperature materials processing [1].

In contrast to the single mode fixed frequency system which uses magnetron for microwave generation, the VFM oven uses Travelling Wave Tubes (TWT) to generate microwave. TWT is a broadband microwave amplifier which allows the microwave YIG oscillator for microwave signal generator, which then gives both fixed and variable frequencies depending on the user's selection. The resulting signal is then fed to the TWT for high power amplification. The diagram of a VFM oven is briefly explained in the following Figure 1.

This paper reports the results of cavity characterization for selected thermoplastic polymers, ABS, Acrylic, Plexiglass, and PVC, which were swept between 6 and 18 GHz individually to determine the best frequencies for microwave processing. These optimum microwave frequencies were then used for the determination of temperature profile. All thermoplastics underwent microwave heating to reach 50 degrees C temperature and set not to exceed the selected 15 minutes. Their temperature profiles showing the relationship between the increasing temperatures versus the corresponding count times were plotted to show how rapid the temperature rise due to VFM oven heating.

Exploring the RA revision process: Making implicit knowledge explicit

"writing from a culturally different rhetorical perspective"

As discussed earlier, SV and AL do not share a common metadiscourse. This can lead to apparent disasters. For example, at the opening of discussions, when AL presented SV with Swales' work showing the 4 moves and asked "Do you automatically write a paper like that, using those 4 moves?" SV replied "No." This was a discouraging opening to the discussion. However, when he later clarified this 'no', it became clear that he did actually follow the moves, although he may not have written it in the order given by Swales.

"I generally just write the introduction in the sense of from the broad to the very specific. And somewhere in there I add the need. I'm not sure in what order that comes. As I'm writing it I realise there is a need, so I write the need part, and then I realign where that need comes in the introduction."

The 'need' appears to equate to Swales' move 2; establishing a niche. As SV writes from the general information towards the specific, he asks himself "Why do I need this?"

"I'm getting towards the specific and I realize, I have to put a need in there."

He then added that "It's part of the full process. I've trained myself to do that", which would seem to support the proposition that expert writers in a discourse community can produce appropriate texts without thinking about the process. This is further supported by SV's statement that, when writing an RA or a conference paper, "I look up previous articles for the journal or conference". The SV always checks that the model which is being written is in the appropriate genre, and is aimed at the appropriate audience.

PG's draft did not follow a recognisable structure e.g. Swales' model. "PG started to put results in the introduction. He started with a general statement, and then gave the results, and then told me what he's going to do in the experiment, to find out."

From this, it seems that PG is writing from a culturally different rhetorical perspective to SV. In PGs academic understanding, it is essential to put the results as close to the beginning as possible, because they are the most important part of the research work. Contrastive rhetoric findings (e.g. Connor,1996) may offer an explanation as to why PG does this.
SV did not tell PG how to revise.

"I sat there with him, at the keyboard, I don't like pen and paper because I believe that using a red pen on a colleague's work is detrimental. Rather than change it immediately, I discussed with him what we're trying to do. We're talking to an audience, we're trying to tell them, what's the process we went through to arrive at these results."

I said 'listen PG, you've missed out all the information telling people what you did before you tell them what the results are.'

Here, for AL, the Systemic Functional perspective of Tenor shows "the relationship between the speaker and the hearer (or, of course, writer and reader)" (Butt e. al. 1998, p13). Firstly, in the relationship between SV and PG, who is referred to as a colleague, and secondly, in the relationship between PG and the intended audience, who must be told the process before the results, as this is their expectation of the structure of an RA.

PG did not agree at first, and SV did not press him. "He thought about it, then he agreed."

The process through which PG was made aware of the need (SV's terminology) or 'the gap' (Swales') is perhaps the most interesting. It began with SV asking "OK PG. You tell me, in your own words, what did you do?" SV typed out PG's exact words and PG then altered the structure so that it represented what he had done, in chronological order, "A before B or whatever" to his satisfaction. It was not until PG was happy with the experimental process that SV could ask the crucial question, "Now, where'd you get this idea from?". The following sequence resulted.

PG "Ah! I read it in the paper so and so."

SV "Ah! OK. Get the paper. So he went to get the paper. Alright, now we've got one of the references. So that goes back in the introduction."

Through this elicitation process, references needed in the introduction were either found, or moved from an inappropriate section into the introduction.

SV "I talked to him about what he did. I said, OK, has anybody else done this type of work? Then we'd go more into the method and I'd say, OK. Where'd you get this method from?"

PG "Oh! Jones did it. Or Smith did it."

SV "How do you know who did it?"

PG "Oh! Cause Joe gave me this paper, or so and so told me, or when I was in the States I found out this information."

SV "There was only one reference hinted to in the introduction, one [1]. But other references are the company, Lambda technology. And where they used it, Oak Ridge National Labs, USA. And what type of microwave we used, a travelling wave tube generator. that all had to go back into the introduction."

AL "So none of that was in the introduction?"

SV "That was in methodology"

Swales' Move 2, establishing a niche by finding a gap in previous research is indicated in the RA by the phrase, "In contrast to the single mode fixed frequency microwave system...the VFM oven uses ...". This phrase was not in the original draft by the PG. When asked how SV elicited this most essential information, and what it represented, SV reported the following conversation:

SV "I said, why did you use this machine?"

PG "Cos it was here."

SV "But why did you think to use this machine?"

PG "It was all that we had."

SV "But is there any other reason?"
"Well, it's a different way of doing it."

"And that was it. And that was the crux, because it's a different way of doing it that he'd thought about."

The general and specific information, Swales' Move 1, was restructured in the RA by SV's decision, because PG "did not have sufficient knowledge to do that. Most Masters' students don't."

"Operating process are fairly general, and I thought they should go in the Introduction part. Whereas descriptions of the samples themselves should go into the experimental part."

When AL asked how he persuaded PG to agree to this, he said quite openly "Because I'm his boss." However, he immediately qualified this by pointing out that "he'd seen previous papers had been accepted with that format, without too many comments."

Outcomes of the Process

"I just do it - but that comes from practice"

After revisions made by PG and SV, this article was accepted for publication in a refereed journal.

We believe this process of questioning and interpretation shows that PG was learning to use the expert knowledge of his supervisor to achieve his own successes, through this cross-cultural 'mentoring' model. In his analysis of why NESBC students have difficulties with the structure of RAs, SV expressed a view that is supported by researchers and teachers working with NESBC postgraduate students. That is, students who do not have a background of experience in the obligatory rhetorical structures of the genre, will have difficulties writing successfully in those genres in English. What SV actually said was, "Many of them have no history of justifying what they do." For SV and AL, our discourse in describing the writing process is different, but our meanings meet.

Closing Remarks

"...passive to active learning"

This study has used the discourse generated in discussion of the writing of the Introduction of a research article by an NESBC student to offer a way of presenting the supervisor's experience of writing. A narrative of personal experience could offer a way of discussing cultural perceptions of writing in this particular academic genre (Connor, 1996), since it would be based on topic and material that was '.a functional and meaningful part of everyday life...to help students become thoughtful practitioners in their learning processes.' (Diaz-Rico, 1999, p 12). According to Belcher, (1994 p24), the academic community, and academic mentors in particular, need to provide a learning environment where the NESBC postgraduate student can move from being a "passive recipient" of learning and become "an increasingly more active participant" in the academic community. We believe our paper has shown one instance of a successful transition from passive to active learning. The outcomes of this process resulted in a professional journal article which the NESBC postgraduate student and his supervisor developed for publication.

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