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The structure of PhD conclusion chapters

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Abstract

This paper considers the generic structure of *Conclusion* chapters in PhD theses or dissertations. From a corpus of 45 PhD theses covering a range of disciplines, chapters playing a concluding role were identified and analysed for their functional moves and steps. Most *Conclusions* were found to restate purpose, consolidate research space with a varied array of steps, recommend future research and cover practical applications, implications or recommendations. However a minority were found to focus more on the field than on the thesis itself. These field-oriented *Conclusions* tended to adopt a problem–solution text structure, or in one case, an argument structure. Variations in focus and structure between disciplines were also found.

Keywords: Thesis/dissertation; Genre; Academic writing; Disciplinary variation; Conclusion; English for academic purposes

1. Introduction

The genre analysis of academic writing has tended to focus on the research article (RA) far more than on longer theses and dissertations for research degrees (Bunton, 2002; Swales, 1990). Where *Conclusions* have been considered, it has usually been as part of the *Discussion* section of an RA or MSc dissertation (Dudley-Evans, 1986, 1994), the one exception being Yang and Allison's (2003) study of the final sections of RAs in applied linguistics, where they found and analysed final sections called *Conclusions* and *Pedagogic Implications*. However, in a PhD thesis the *Conclusion* usually has the status of a separate chapter, as confirmed by Paltridge's (2002) survey of guide books and actual practice, in which there is a *Conclusions* chapter in each of four thesis types he presents:

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Traditional-simple and Traditional-complex (drawing on Thompson, 1999), Compilation of research articles (drawing on Dong, 1998) and Topic-based. However, there is a lack of published research on the actual structure of PhD *Conclusions*, the closest being Hewings' (1993) analysis of six MBA *Conclusions*. This study, therefore, set out to discover what common, generic features PhD *Conclusion* chapters in a range of disciplines share and what variety they display.

The paper begins with a review of previous research into *Discussions* and *Conclusions*, describes the corpus of 45 PhD theses and methods of analysis, then presents the findings and proposes three models for *Conclusions* with some disciplinary variation.

2. Previous research

In one of the early studies of the research article, Hill, Soppelsa, and West (1982, pp. 335–338) categorised the "rhetorical divisions" of an experimental-research paper as *Introduction*, *Procedure* (*Methods* and *Results*) and *Discussion*. They suggested that the *Introduction* moves from the general to the particular, the *Procedure* then focuses on the particular, and the *Discussion* moves back as a 'mirror image of the *Introduction*' from the particular to the general: from 'the solution of the problem that motivated the study to the implications of that solution for the larger field'. The conclusion of the *Discussion* which they analysed notes limitations of the study and suggests areas for future research. To paraphrase, Hill et al. typify the *Discussion* as comprising: *Implications* ∧ *Limitations* ∧ *Recommendations.*

Some of the most important work on *Discussions* has been done by Dudley-Evans. His work is particularly relevant to this study as it was carried out on the longer genre of the Masters dissertation, rather than the research article. His 1986 study of the *Introduction* and *Discussion* sections of seven MSc dissertations found three main parts to the *Discussions*: *Introduction, Evaluation of results* and *Conclusions and future work*. He identified 11 moves, modified in 1994 to nine moves, in the *Evaluation of results*: *Information move, Statement of results, Finding, (Un)expected outcome, Reference to previous research, Explanation, Claim, Limitation* and *Recommendation*. He noted that the moves were usually cyclical, with each cycle normally headed by a *Statement of results*, which was the only compulsory move, the others being optional. The *Conclusions and future work* part, the most relevant to this study, he found to contain:

Summary of main results
Summary of main claims
Recommendations about future work.

Even in this research on MSc dissertations, the *Conclusion* described is still a part of the *Discussion* section rather than a separate section or chapter.

Peng (1987), looking at chemical engineering research articles, found *Discussion* moves very similar to those of Dudley-Evans. She also found that the cycles were either at a higher level, answering research questions, or "at a lower level (dealing) with each separate step in the author's argument…" (p. 94). Peng does make a short reference to

a *Conclusion* section in which "deductions and implications of a wider nature are presented" (p. 112). Posteguillo's (1999) study of Computer Science RAs analyses their final sections but does not distinguish between those called *Discussion* and those called *Conclusion* and the analysis is based on Dudley-Evans' *Discussion* moves with the addition of Swales' (1990) *Deduction and hypothesis* move.

Even in advice given to students, the distinction between *Discussions* and *Conclusions* is not always made. Swales and Feak (1994, p. 195), in a chapter on writing research papers (not dissertations/theses), state: "we will not distinguish between these two terms (*discussion* and *conclusions*) since the difference is largely conventional, depending on traditions in particular fields and journals." They point out that *Discussions* are *interpretive*, dealing with *points*, in contrast to *Results* which are *descriptive*, dealing with *facts*. They propose three moves for *Discussions*, the first quite extensive, consolidating research space, and the other two quite short, dealing with implications and further research.

Another research-based book of advice to students, Weissberg and Buker (1990, pp. 160–162), makes a similar point about the *Discussion*/*Conclusions* distinction: the last section of the experimental research report, they write, is "usually titled *discussion*…(but) sometimes…is called *conclusions*." They then summarise the content of a *discussion* as including first those elements most directly related to the study and later those focusing more generally on the importance of the study for other workers in the field. These later elements are:

Implications of the study
Recommendations for future research and practical applications.

Nwogu's (1997) analysis of the structure and functions of the medical research paper has no separate *Conclusion* section, but the final move in the *Discussion* section is *Stating research conclusions*, concerning further research rather than practical applications or generalisations.

One of the only studies that report on separate *Conclusion* sections in RAs is Yang and Allison (2003) as they set out to see how writers in applied linguistics move from results to conclusions. They found *Conclusion* sections in 13 of 20 such RAs (65%) on empirical research, and six final sections (30%) on *Pedagogic Implications*. The more frequent moves and steps they found in the *Conclusion* sections are set out in Table 1.

Finally, Hewings' (1993) study of MBA dissertation *Conclusions* (which also included RAs) showed *Reporting, Commenting* (e.g., evaluations, deductions, speculations)

Table 1
Moves and steps in RA conclusion sections

Move 1: summarising the study	
Move 2: evaluating the study	Indicating significance
	Indicating limitations
Move 3: deductions from the research	Recommending further research
	Drawing pedagogical implications

(Yang & Allison, 2003, p. 379)

and *Suggesting* functions which operate in four different domains: the world, previous research (literature), and the current study's procedures or findings.

This review has shown that *Discussions* are more prominent in the literature than *Conclusions*. The *Conclusion* is usually seen as an alternative (and less common) name for the *Discussion* section of a research article, as the final part of the *Discussion* section of an MSc dissertation, or the final chapter of an MBA dissertation. None of the studies look at PhD thesis *Conclusions*.

The study from which this research grew (Bunton, 1998) found that the structural prominence of *Discussions* and *Conclusions* with the PhD theses is reversed: there was nearly always a final chapter with *Conclusion(s)* or *Summary* in the title but rarely a chapter with *Discussion* in the title. In that study, some theses had sections called *Results and Discussion* or *Findings and Discussion*, and some had sections called *Conclusion(s)* in most of their chapters. Those earlier *Conclusion* sections were all found to contain discussion (see Section 4.1).

A key question which this paper will set out to answer is what happens when the *Conclusion* becomes a chapter? Or to put it another way, if there has already been discussion in earlier chapters or sections, are there qualitative differences in the concluding chapter of a PhD thesis compared with the final part of an article or dissertation *Discussion*?

3. Method

This study expanded the original corpus of 13 PhD theses in Bunton (1998) to 45, the same 45 theses as in the study of PhD *Introductions* reported in Bunton (2002). Theses were selected from departments and faculties across the University of Hong Kong (HKU) proportional to their PhD output, but with not more than four theses from any one department. The faculties represented (and the number of theses) were: Arts (3), Education (3), Social Sciences (7) Architecture (1), Engineering (10), Science (12), Medicine (6), Dental (1), plus the School of Business (1) and the Centre for Urban Planning & Environmental Management (1). Most of the thesis writers were Chinese speakers from Hong Kong or mainland China. However, 11 theses, nearly a quarter of the corpus, were written by non-Chinese research students, most of them native or near-native speakers of English from Western countries or the South Asian sub-continent. It should also be noted that about 40% of supervisors and 60% of the external examiners at the time were non-Chinese from other countries, indicating a strong influence of international academic conventions on the thesis-writing process at HKU.

One interest in the study was to see if there were disciplinary differences in the way *Conclusion* chapters were written. Swales' (1981) study of RA *Introductions* selected them from three fields: (a) *hard* sciences, (b) the biology/medical field and (c) social sciences. Casanave and Hubbard (1992) separated their corpus into science and technology disciplines (ST), and humanities and social sciences (HSS). This study adopted the ST/HSS distinction for comparison purposes, with 30 theses coming from ST disciplines and 15 from HSS disciplines.

The first task was to identify the concluding chapters, but this was not as straightforward as one might expect. Analysis began with the final chapter of each of the 45 theses. However, in two cases it was found that the second last chapter was called "Conclusion(s)" and the final chapter was called "Recommendations" or "Future Work" respectively. As these are common section headings in other *Conclusion* chapters, the final two chapters of these two theses were analysed as if they were one chapter in two sections. Another thesis was in two parts with a *Conclusion* chapter to each part but no overall concluding chapter. In the same way, these two chapters were treated as if they were one chapter in two sections. Conversely, one thesis had no chapter that played any concluding role and so it was omitted from the analysis, other than to note that one of 45 PhD theses had no concluding chapter and to reduce the number of ST *Conclusions* to 29. Finally there were three cases in which the concluding role was found only in the final section of a longer final or penultimate chapter. In one case the final chapter, with a topic-specific title, covered a new area of the research, with the final section called "Conclusion" (the previous three chapters, by contrast, ended with sections called "Summary"). In the second case the final chapter was titled "Discussion" and was the first instance of discussion in the thesis; its final section was called "General discussion and future direction of study." In the third case, there were only three chapters, *Introduction, Discussion* and *Experimental*, and the final section of the *Discussion* chapter was titled "Conclusion." A check on RAs in this field (Chemistry) showed that it is common to have the method described in a final part of the article called 'Experimental' In these three cases the final section of the final or penultimate chapter was treated as the conclusion. This left a corpus of 44 thesis conclusions, 38 of them single chapters, three being two chapters, and three being the final section of a final or penultimate chapter. Nonetheless, in this paper I shall refer to them all as concluding *chapters* (or *Conclusions*) as this is their most common status.

Once the 44 *Conclusions* were identified, their titles, section headings and lengths were compared, as well as the number of references they make to previous research in the literature. The biggest task was to analyse the *Conclusions* for the generic moves and steps their authors make to achieve their purpose. Moves and steps already identified and described in the literature (particularly Dudley-Evans, 1994; Swales & Feak, 1994; Weissberg & Buker, 1990) were taken as the starting point for analysis, but where part of the text seemed to have a purpose different from anything already identified in the literature, a new move or step was proposed. As work progressed all *Conclusions* were re-analysed at least once to see whether they too contained moves or steps newly identified in other *Conclusions*. Finally, models of thesis *Conclusions* were proposed using the moves and steps usually present (i.e. in at least half the chapters) and those present in a quarter of them, with particular attention given to differences between the ST and HSS disciplines.

It should be noted that citations from certain theses do not contain keywords indicating the subject matter in order to respect a promise of anonymity given to writers in the original study. What is cited is thus the non-subject-specific language which, in fact, constitutes the linguistic signals of these moves and steps. Key lexical signals are given in bold.

4. Findings

This section will report the findings, first on the status and titles of concluding chapters, then on their length, number of references, section headings, and finally the generic moves and steps identified, proposing three models for thesis *Conclusions*

4.1. Status of concluding chapters

As we saw in the literature review, RA *Conclusions* have often been found to be the final part of a *Discussion* section, not constituting a section in their own right. If that is so, the structural status of *Discussions* and *Conclusions* is virtually reversed in PhD theses. Forty one of the 45 theses in this corpus have one or even two chapters that play a concluding role, although their titles vary considerably (see Table 2). Only six theses (all in ST disciplines) have chapters called "Discussion" that are not *Conclusions*, while nine more have "Discussion" in the title of the concluding chapter. It is more common for sections to be titled "Discussion": 15 theses (12 in ST disciplines) had between two and six sections of chapters called "Discussion" or "Results and Discussion." Twenty four of the 45 theses had no chapter or section with 'Discussion' in its title. Of course, discussion often takes place in chapters or sections with other, topic-specific titles. Analysis in the earlier study (Bunton, 1998) on 13 of these theses showed that discussion was taking place before the concluding chapter in all of those theses, only four of which had sections called "Discussion."

4.2. Titles of concluding chapters

Titles are important as they give some idea of the role which the writer sees a chapter or section playing. The titles of concluding chapters were found to vary considerably. Only 24 of the 44 are called simply "Conclusion" or "Conclusions." Two are called "Concluding Remarks." Three, all in ST disciplines, are called 'General Discussion' to distinguish them from 'Discussion' sections elsewhere in those theses. One concluding chapter had a topic-specific title rather than a generic one but was found to play a concluding role. The other 16 concluding chapters had different titles that combined various elements that are often seen as part of a concluding role. They are all set out in Table 2.

Table 2
Titles of 44 PhD concluding chapters/sections

Conclusion (13)	General discussion (3)
Conclusions (11)	General discussion and conclusions
Concluding remarks (2)	General discussion, implications and conclusions
General c'onclusion	General discussion and future direction of study
Concluding general discussion	Discussion
Conclusions and recommendations	Summary
Conclusions and Implications	Summary and conclusions
Conclusions and prospects	Summary and future research
Conclusion–discussion	General summary
	Topic-specific title

These varied titles indicate six major roles that the writers see a conclusion playing:

- Summarising thesis findings
- Discussing the findings more broadly than in earlier chapters
- Coming to conclusions (more generalised than findings)
- Giving implications of findings
- Making recommendations
- Suggesting areas of future research.

4.3. Length

The lengths of the 44 thesis *Conclusions* ranged from 2 to 38 pages, averaging 9.2 pages. There was a marked difference, however, between those in ST disciplines and those in HSS disciplines. ST conclusions averaged 4.9 pages, while HSS conclusions averaged 17.2 pages.

4.4. References

The number of references to other authors in a thesis *Conclusion* is of interest as it gives some indication of how much the conclusion refers back to previous research in summing up the findings and significance of the thesis and in making recommendations for further research. When this is expressed as a percentage of the number of references in the thesis as a whole, it gives an indication of the importance of the concluding chapter compared with other chapters in positioning the research study in relation to the literature. In these 44 thesis *Conclusions*, the number of references to the literature ranged from nil to 112, averaging 21.0. There was again a marked difference between ST *Conclusions*, which averaged 16.6 references (or 3.7% of the total number of references in the thesis) and HSS *Conclusions* which averaged 29.2 references (or 6.0% of total references).

Compared with other chapters in the thesis, all but two ST *Conclusions* had the lowest or second lowest number of references. This was also true for nine of the 15 HSS *Conclusions*, indicating that reference to previous research may play a relatively small role in most thesis conclusions, especially in the ST theses. On the other hand, it could be argued that where there has been an extensive literature review, it may only be necessary to refer to a few key studies in order to place the current research in context and show its significance. By contrast, two HSS *Conclusions* had the second highest number of references in the thesis, one in Education, the other in Architecture.

4.5. Section headings

Section headings are also helpful in showing what the writer is hoping to accomplish in different parts of the chapter, the moves the writer has in mind. However, slightly more than half of the concluding chapters (23 of 44) were not divided into sections (especially in ST disciplines). The 21 that did have sections had between two and eight sections, the ST *Conclusions* with sections averaging 2.5 sections each and the HSS *Conclusions* with sections averaging 5.2 sections each.

Table 3
Keywords in generic section headings in 12 ST PhD *conclusions*

Present more than once	Present only once
1st section heading	*1st section heading*
Summary (2)	Contributions
Discussion (2)	
Conclusion(s) (5)	*Intermediate section heading*
	Methodological aspects
Intermediate section heading	Limitations
Recommendations (2)	Implications
Final section heading	*Final section heading*
Future work (4)	Future directions
Future/further research (3)	Further studies
	Epilogue

The vast majority of section headings were generic ones indicating the function of the section, but where there were topic-specific headings there were usually between two and five of them, more often in HSS disciplines.

ST thesis writers seemed to have two main moves in mind: one presenting conclusions about the present study and the other concerning future work. Keywords from their section headings are presented in Table 3.

The HSS concluding chapters, which we have seen were generally longer and had more sections when sections were present, had more varied patterns of headings, including research questions, implications and theory (see Table 4). In one case, the four topic-specific section headings were the thesis' research questions.

4.6. Two types of concluding chapter

Analysis of the moves and steps in concluding chapters soon indicated that while most *Conclusions* focussed mainly on the thesis itself, beginning with a restatement of purpose

Table 4
Keywords in generic section headings in nine HSS PhD *conclusions*

Present more than once	Present only once
1st Section Heading	*1st Section Heading*
Summary (3)	The Approach
Findings (2)	The Arguments
	Overall Validity
Intermediate Section Headings	
Research Questions (2)	
Implications (2)	*Intermediate Section Headings*
Recommendations (2)	The (local) Context
Limitations (2)	
Final Section Heading	*Final Section Heading*
Future/Further Research (4)	Cautionary Notes and Research Directions
Theoretical Implications (2)	A Final Word
Concluding Remarks (2)	

and a summary of findings and claims, a minority of *Conclusions* focussed mainly on the field and only mentioned the thesis and its findings or contributions in the context of the whole field. This difference affected the move structure of the chapters. I have classified the two types of *Conclusion* as *thesis-oriented* and *field-oriented*. There were eight field-oriented *Conclusions*: four in ST disciplines and four in HSS areas, the other 36 being thesis-oriented *Conclusions*.

4.7. Thesis-oriented conclusions

It should be noted that this paper adopts a 2-level Move and Step analysis (as in Swales, 1990), where a number of the Steps correspond, as Yang and Allison (2003, p. 377) point out, to the "more narrowly specified Moves" in Dudley-Evans' (1994) analyses. Yang and Allison show the difference in this way: "The concept of Move captures the function and purpose of a segment of text at a more general level, while Step spells out more specifically the rhetorical means of realizing the function of the Move" (p. 370).

4.7.1. Introductory restatement

Most thesis-oriented *Conclusions* were found to begin with a distinctive move that restates the overall issue being researched. In the HSS *Conclusions* it tended to be the purpose, research questions or hypotheses that were restated. The ST *Conclusions* tended to restate the *work carried out*, to use a term from Dudley-Evans' (1986) analysis of MSc dissertation *Introductions*. It was decided that such an opening constituted an *Introductory Restatement* (IR) move, and it occurred in 34 of the 36 thesis-oriented *Conclusions*.

This move is relatively easy to identify, appearing at the beginning. A typical restatement of territory, niche and work carried out is as follows, citing the beginning and end of the first paragraph of the concluding chapter:

> **Although** the X of As has been **extensively studied** in the past few decades, the X of ABs has remained **relatively unexplored**.……**In this work**, the X, Y and Z of ABCs and ABDs **have been presented and discussed in detail**. (ST1)

4.7.2. Consolidation of research space

The largest part of most thesis-oriented concluding chapters was taken up with summarising methods, results/findings and claims, with references to previous research. The nature of this important move is best captured in Swales and Feak's (1994) term, *Consolidate your research space*. This main move in a concluding chapter, *Consolidation of research space* (C), occurs in all 36 thesis-oriented *Conclusions*.

4.7.3. Recommendations

Towards the end of most thesis-oriented *Conclusions* were one or two moves that stood out as going beyond the present research and linking it to the wider world and/or to future research. Writers often signalled them with headings such as "Future Work," "Future Research," "Recommendations" or "Implications." However, the term *recommendations* is used with two different meanings in this corpus and in the literature. It is most frequently used in the literature for future research (e.g., Dudley-Evans, 1986, 1994), but is also used

by Weissberg and Buker (1990) in connection with practical applications as well as future research. This duality is illustrated by a section headed "Recommendations" in one ST *Conclusion* and including three recommendations for *research directions*, then in the next paragraph, three more regarding social measures that should be taken in view of the research findings. There were clearly two different kinds of recommendation being made in this thesis and in the corpus as a whole, so it was decided to differentiate them as two separate moves:

- *Practical Applications, Implications or Recommendations* (P) when it concerns real-world uses for the research or *advice* for real-world situations springing from the findings, and
- *Recommendations for Future Research* (FR) when the move indicates further avenues for research.

ST *Conclusions* more often made *Recommendations for Future Research* as a distinctive move, while HSS *Conclusions* more often had a distinctive move about *Practical Applications, Implications or Recommendations*. However, brief recommendations of either kind were also found embedded in other moves, particularly the *Consolidation* move.

4.7.4. Recommendations for future research

Typical *Recommendations for Future Research* moves from ST and HSS *Conclusions* respectively begin as follows:

> This method certainly **merits further investigation** especially in problems involving a lot of unknowns, such as the following:… (ST5)

> The findings of this research study provide **the following insights for future research**:… (HSS11)

4.7.5. Practical applications, implications and recommendations

Two of the *Conclusions* in the Social Sciences had sections called "Policy Recommendations" and six of the *Conclusions* found to be making practical recommendations used the words "recommend" or "recommendation." Such recommendations also tended to use strong modal verbs such as "should" or "must" or other words such as "vital," "essential" or "necessity."

Moves or steps classified here as *Practical Implications*, on the other hand, tended to use weaker modals such as "can," "could," "may," or "might" or a less certain verb such as "hope." The term "implications" was also found to be used in two ways, one HSS *Conclusion* indicating the difference very clearly with one section headed "Practical Implications" and containing a number of *Findings, Claims* and *Practical implications* and another headed "Theoretical Implications" and containing mainly *Findings, Claims* and *Theory* steps.

The distinction between *real world* implications and theoretical implications is not made clearly in the literature. Weissberg and Buker (1990, p. 162) refer to "implications of

the study (generalizations from the results)" and Peng refers to "deductions and implications of a wider nature" (1987, p. 112), while Swales and Feak (1994) say that *Discussions* should be:

> more theoretical, or more abstract, or more general, or more integrated with the field, or more connected to the real world, or more concerned with implications or applications, and if possible some combination of these. (p. 196)

Analysis of this corpus indicates that *Practical implications and applications* (i.e., connected to the real world) have a greater prominence in thesis *Conclusions* than the literature has suggested.

Practical Applications are more common in ST *Conclusions* than in HSS ones. Writers are much more direct (without need for modals) either because the application has already been made, for example:

> The understanding gained from this research **has provided an input** to the XY (industry). (ST4)

or because the writer is more certain that the application will be made, for example:

> D **is used as** an E indicator, which is **intended for applications in** G and H (establishments). (ST7)

Writers in the Humanities and Social Sciences on the other hand convey a sense of exhortation as they are often relying on a broader range of individuals and organisations in society to carry out their recommendations or heed their implications. This is done with the use of modality to say that something *should* be done in the real world, for example:

> An **implication** of these findings is that both B and C **should** be taken into account on evaluating a D. (HSS10)

Practical Applications, Implications or Recommendations moves appear earlier than *Recommendations for Future Research* moves by a margin of eight to three. They also appear as steps embedded in the *Consolidation* move, to connect different parts of the research to real world uses or situations, more often than *Future Research* steps.

Table 5 gives an overview of the number and proportion of ST and HSS thesis-oriented *Conclusions* containing these moves. As can be seen there, there was occasionally

Table 5
Moves found in thesis-oriented PhD *conclusions*

Moves	ST ($N=25$)		HSS ($N=11$)	
	N	%	*N*	%
1. Introductory restatement	23	92	11	100
2. Consolidation of research space	25	100	11	100
3. Practical applications/implications/recommendations	9	36	6	55
Embedded elsewhere	7	28	2	18
4. Recommendations for future research	20	80	4	36
Embedded elsewhere	1	4	4	36
5. Concluding restatement	1	4	3	27

a *Concluding Restatement* move, which reiterated overall findings and claims, rather than purpose.

The moves, in 30 of the 36 thesis-oriented *Conclusions*, appeared in a single progression, typically IR∧C∧P∧FR. Only in six cases was there any cycle of recurring moves, for example, IR∧C∧P∧C∧FR. In this sense, the move structure of these *Conclusions* is more straightforward than that of the *Introductions* to the same 45 theses, where only three showed a single progression of the moves (*Establishing a Territory, Establishing a Niche* and *Occupying the Niche*); with the number of move cycles in *Introductions* averaging 5.5 (Bunton, 2002).

4.8. Different ST and HSS models for thesis-oriented conclusions

In contrast to the moves, which mostly occurred in a single progression, the steps within the moves often occurred in multiple cycles, particularly in the *Consolidation* move:

- One HSS *Consolidation* move reported 105 Findings, made 23 Claims, and 38 References to previous research, with many cycles of Finding∧Claim∧Reference;
- One ST *Consolidation* move had 31 Findings, 22 Claims and 52 References to previous research.

From the data on frequency and distribution of the various moves and steps in ST and HSS thesis-oriented *Conclusions*, it is possible to propose two different models with the moves and steps that occur in at least half of the ST and HSS thesis-oriented *Conclusions* respectively, plus an additional record of moves and steps that occur in at least a quarter of the respective *Conclusions*. The frequency of these moves and steps is also recorded as the number of occurrences divided by the number of *Conclusions* being analysed (in this case, 25 ST and 11 HSS).

As can be seen in Tables 6 and 7, three moves are usually present in both models, the first two being *Introductory Restatement* and *Consolidation*. They differ in their final move, ST concluding chapters usually finishing on *Future Research* while HSS concluding chapters more often have a *Practical Implications and Recommendations* move.

We have already noted that the ST *Introductory Restatement* usually focuses on *work carried out* while HSS ones more often focus on purpose, research questions or hypotheses. In both models the *Consolidation* move includes summaries of method, findings/results and claims as well as making references to previous research. However, the ST *Consolidations* also report on *products* of the research (see next section), in some cases evaluating them as well. While only 36% of the ST thesis-oriented *Conclusions* had a distinct *Practical Applications and Recommendations* move, another 28% had such applications or recommendations embedded in the *Consolidation* or *Future Research* move. Conversely, only 36% of HSS thesis-oriented *Conclusions* had a distinct *Recommendations for Future Research* move, but another 36% embedded such recommendations in the *Consolidation* move or in *Practical Implications and Recommendations.*

Table 6
Science and technology thesis-oriented PhD *conclusions* ($N=25$)

Usually present ($\geq 50\%$)	Freq.	Present $\geq 25\%$	Freq.
Move 1: introductory restatement	**0.92**	Territory	0.28
Work carried out	0.56	Centrality	0.36
		Gap/niche	0.28
Move 2: consolidation of research space	**1.16**	Evaluation of method/product	1.44
Method	3.28	Explanation	1.16
Findings/results	7.64	Uncertainty	0.32
Claims	5.44	Significance	0.88
References to previous research	4.56	Limitations	1.16
Product(s)	1.64	Recommendations for future research	0.4
		Practical applications or implications	0.48
		Move 3: practical applications and recommendations	**0.36**
		Applications or implications	0.28
		Recommendations	0.28
Move 4: future research	**0.8**	Previous research	0.52
Recommendations	2.88	Limitations	0.48

Table 7
Humanities and social sciences thesis-oriented PhD *conclusions* ($N=11$)

Usually present ($\geq 50\%$)	Freq.	Present $\geq 25\%$	Freq.
Move 1: introductory restatement	**1**	Gap/niche	0.45
Purpose, research questions or hypotheses	1.09	Method	0.36
		Reference to previous research	0.45
		Preview of chapter	0.27
Move 2: consolidation of research space	**1.18**	Evaluation	0.9
Method	2	Explanation	0.64
Findings/Results	24.45	Theory	1.82
Claims	14.45	Information	0.73
References to previous research	14.09	Significance	0.82
		Question-raising	0.27
		Limitations	1
		Future research	1
Move 3: practical implications and recommendations	**0.55**	References to previous research	2.09
Implications	218	Claims	2.00
Recommendations	2.09	Caution/warning	0.27
		Move 4: future research	**0.36**
		Recommendations	1.36
		Move 5: concluding restatement	**0.27**
		Overall claims/findings	0.45

4.9. Distinctive steps

This section will discuss more fully some of the steps in concluding chapters which are not adequately accounted for in the literature on *Discussions*.

4.9.1. Method

Methods had greater prominence in these concluding chapters than the *Discussion* literature would suggest. Only Dudley-Evans (1994, p. 225) mentions methods in his moves for *Discussions* and this is always in a less prominent sense, as an aspect of another move: in *Information* moves (giving background on theory, aims, methods or previous research), in *Limitations* (giving caveats about findings, methods or claims), and in *Recommendations* (for future research or methods). Methods were particularly prominent as steps in the *Consolidation* move of 20 of the 25 ST thesis-oriented concluding chapters, and in six of the 11 HSS ones. *Method* steps were also found in five of the eight field-oriented *Conclusions*. A typical example is as follows:

> The X and Y variations of A **are studied by** B and C **models**. **Computed results of the** B **model** indicate that…**The** C **model** demonstrates that… (ST4)

4.9.2. Product

More than half the ST theses have a strong product orientation (14 of the 25 thesis-oriented *Consolidation* moves). For example, in three different paragraphs of the same concluding chapter:

> **A set of** Q functions **is developed and adopted** as…**A new** R **method is developed and applied** to…S functions are employed …**for the development of a new** T **technique**. (ST6)

In cases like this one, the method is treated as a product and is then evaluated as such.

4.9.3. Evaluation of method or product

In nearly half of the thesis-oriented *Conclusions* (17 of 36) an evaluative step was found which related directly to *Method* and/or *Product* steps. For example, a positive evaluation of a product:

> Based on the D experiments, an E model has been formulated…Predictions of the model **can greatly assist in the effective planning** of Gs. (ST4)

or a negative evaluation of one method followed by a positive evaluation of another method:

> **Although results obtained** from the H functions are **not satisfactory, good results are obtained** from the use of J functions. (ST5)

Evaluation also plays a key role in field-oriented *Conclusions*, appearing in all but one as part of the Situation–Problem–Solution–Evaluation text structure (see Table 8).

Table 8
Field-oriented PhD *conclusions* ($N=8$)

Usually present ($\geq$50%)	Freq.	Present $\geq$25%	Freq.
Situation	2.13	Preview of chapter	0.38
Problem	3.75	Centrality	0.38
Solution	5.25	Information	0.5
Evaluation-positive	2.75		
Evaluation-negative	3		
References to Previous Research	7.5		
Gap/Niche	0.63		
Method	2.13	Purpose	1.13
Findings/Results	10	Product(s)	0.5
Claims	8	Theory	1
Significance	1	Prediction	0.38
Caution/Warning	1.25	Justification	1.25
Practical Implications and Recommendations	4.13		
Future research recommendations	1.75	Limitations	1.25

4.9.4. Theory

This step occurs when a writer mentions a theory in support of a method or findings, usually without citing any author or publication. It occurs in thirteen of the concluding chapters, proportionally more in HSS disciplines, for example:

> No B assumptions are imposed and CD **theory is adopted**. (ST6)
>
> This is **in line with the notion of** XY. (HSS12)

4.9.5. Caution or warning

This step occurs in eight *Conclusions*, all but one in HSS areas. It usually occurs with *Practical Implications or Recommendations* and warns or cautions about what may happen if the writer's advice arising out of the implication is not heeded. This example is from the last two sentences of a thesis:

> The **alternative of not** (**doing this**) has been expressed by J: "…". This surely is **a situation that none of us would like to see** (4559).

4.9.6. References to previous research

This step, of course, is commonly mentioned in the literature, but rather than Dudley-Evans' (1994) category for references that *compare* results with previous research, it seemed more useful to identify references that either *support* or *contrast* results or findings with previous research. This study, therefore, made a distinction between *supportive* and *contrastive* references to previous research. HSS writers made 187 supportive references to previous research and 34 contrastive references, while the ST writers made 129 supportive references to previous research and 11 contrastive ones.

Proportionally contrastive references were about twice as frequent in HSS *Conclusions* as in ST *Conclusions* (15–7%).

A further category was also identified, where the reference to previous research adds to the *background* before results are given or claims/explanations are made. These were more common in ST *Conclusions* (26 instances) and rare in HSS *Conclusions* with only two instances.

4.10. Field-oriented conclusions

Having considered thesis-oriented *Conclusions*, the majority in this corpus, we shall now consider the eight field-oriented *Conclusions*. As mentioned in Section 4.6, these *Conclusions* focussed mainly on the field rather than on the thesis or the specific research study itself. Seven of the eight were characterised by a Problem–Solution–Evaluation structure (e.g., Hoey, 1983) in their approach to issues in the field. The eighth, in the field of Literature in English, followed an argument structure of Claim–Counterclaim–Justification (e.g., Jordan, 1984). Following is an example of a Problem–Solution–Evaluation cycle in a field-oriented ST concluding chapter:

In some A regions, the peaks of the Bs are **too** close together and are **completely unresolved**. This intruduces **error** in the final determined Cs.	PROBLEM
Obviously this handicap **can be solved if** one can study one B at a time	SOLUTION A
However, the Bs are **extremely expensive**...	NEG EVAL
Instead, the DF-meter **can be** integrated into the GF-meter to separate the Bs in real time. (ST3)	SOLUTION B (POS EVAL)

There is an implied positive evaluation in the last sentence, especially as it is the last sentence of the chapter and thesis.

Five of the eight field-oriented *Conclusions* fully integrate a wide range of moves and steps with the focus always on the field, while three, after a substantial section on the *Field*, move on to one or two of the moves already identified in thesis-oriented *Conclusions*. Those three could be considered to have these moves:

Field ∧ Consolidation
Field ∧ Practical Recommendations ∧ Consolidation
Field ∧ Restatement ∧ Future Research

To illustrate the transition from field- to thesis-orientation, the 5-page chapter characterised above as *Field ∧ Consolidation* begins with three-and-a-half pages summarising the world-situation in this field with a Situation–Problem–Solution–Evaluation structure, with only one reference to the purpose and approach of the thesis, culminating with Hong Kong's unique situation in this regard with further Problem–Solution analysis. Only in the final page-and-a-half does the focus change, signalled with

the words: "Through examining Hong Kong's X characteristics with regard to the Y criteria, we have shown that…" (HSS42).

A summary of the steps found in at least a quarter of the field-oriented *Conclusions*, together with their frequencies, is presented in Table 8.

5. Conclusion

This paper has indicated that the generic structure of the *Conclusion* chapter of a PhD thesis differs qualitatively from the final part of a *Discussion* section in a research article or masters dissertation, displaying a wider range of moves and steps Concluding chapters showed some disciplinary variation between science and technology disciplines and those in the humanities and social sciences. HSS *Conclusions* tend to be longer and have more sections than ST ones. ST *Conclusions* often had a smaller number of higher-level cycles, concentrating on broader results and claims, while HSS ones more often had a large number of lower-level cycles focusing on individual findings and claims. There was a greater emphasis on future research in ST *Conclusions* and just under half refer to *Practical Applications* which the writers see being put to immediate use in their field. HSS *Conclusions* more often have *Practical Implications and Recommendations* which the writers exhort others in the wider world to heed.

A few of the concluding chapters did not fit this pattern. They focussed more on the field as a whole than on the thesis itself, mostly adopting a Problem–Solution text structure, although one had an argument structure. More research is needed on field-oriented *Conclusions,* particularly ones with an argument structure before a model for that can be proposed.

Given the lack of differentiation in thesis-writing guide books between *Discussions* and *Conclusions*, the provision of research-based models could be of real value to PhD students and their supervisors. As noted in Bunton (2002, pp. 73–74), supervisors "will be more able than their students to see what variations are conventional in their particular fields" and so use the model as "a pedagogical framework around which they build the knowledge they already have, intuitively if not explicitly expressed, about the way research is presented in their disciplines."

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