

CHAPTER 5

DISCUSSION

This chapter consists of two parts. It compares the results of the present study with previous studies. The first part discusses the results of the move analysis. The second part discusses the second research question concerning lexical bundles.

5.1 Move Analysis

One of the objectives of the present study is to identify the rhetorical moves of Agricultural Science RAs in order to facilitate the reading and writing of such articles in the future. According to the move analysis presented in Chapter 4, the move structure could be a writing model for novice researchers or student writers in the field of Agricultural Science.

The results of the Move Analysis compare favorably with some previous studies. For instance, the move analysis of Introductions compares well with Nwogu (1997), Posteguillo (1999) and Kanoksilapatham's (2005) studies which examined the structure of IMRD sections in hard sciences. Similarly, 3 moves were found in the Introduction section. In Nwogu's (1997) investigation, Move 1 is an optional move. The purpose of Move 1 is to present background information. The linguistic feature of this move is a predominant use of the present tense. In the present study, Move 1: *Stating why the topic is important* is obligatory, 30 RAs having this move. Unlike

Nwogu's (1997) investigation, the present perfect tense is also common in the present study. In addition, the Step *Making topic generalizations* was frequently but not always used in Posteguillo's (1999) study. In his investigation, the occurrence of this step was 65%. On the contrary, the occurrence of the Step *Making topic generalizations* was 100% in the present study. The possible reason for this difference might be the short history of computer science compared with the history of Agricultural Science.

Kanoksilatham (2005) found 2 variations in Move 2: *Preparing for the present study*, including *Indicating a gap* and *Raising a question*. But in the present study, only one variation was found in Move 2: *Indicating a research gap*. The general function of this move in different studies was quite similar, which is to identify a research gap before detailing the goals of the particular study.

Move 3 contains 3 steps: *Stating purpose(s)*, *Describing procedures* and *Presenting findings*, which is in agreement with Posteguillo's (1999) and Kanoksilatham's (2005) investigations. Interestingly, Step 3: *Presenting findings* was not found in Nwogu's (1997) investigation. Possibly this is because medical researchers want to keep the findings in the Results section, while agricultural researchers would like to report the main findings before the Methods section in order to motivate readers to read further.

The Step *Review of literature* was found to be common in previous studies. The authors in different fields had to comment on past research work before

describing their own. The suggested reason was that this step helps the researcher identify what is already known, how it relates to the research questions, and how the present study might contribute to a greater understanding of the topic.

Some differences were found in the Methods section. For instance, it was common to describe the location of the experimental field in an agricultural context, which was not found in the fields of Medicine, Computer Science or Management. Possibly this was because Agriculture comprises those activities which take place mostly on farms and result in the production of materials for food, clothes and industrial processes. The move *Detailing statistical procedure* was optional in Nwogu's (1997) and Kanoksilapatham's (2005) investigations but it was conventional in the present study. This may be due to the fact that the application of statistical principles and methods is necessary for effective practice in resolving the different problems that arise in the many branches of Agricultural activities.

In Agricultural Science papers, statistical analysis was not the only math method applied to experimental designs. Mathematical modeling was also conducted to calculate data. Therefore, Move 8: *Describing the mathematical modeling of the system* functions to fulfill this purpose, which was not found in other previous move analyses of the Methods section, to my knowledge. A possible explanation for this is that agricultural researchers applied mathematics as a tool for improving the accuracy of agricultural research. Statistics has been regarded as the fundamental tool of the scientific method. With new breakthroughs in computers and computer software, it

has become necessary to improve the traditional approach in agricultural research by including additional mathematical modeling procedures.

In contrast with the move analysis of the Introduction section, the Results section received little attention. Previous studies confirmed that reporting results and making comments on these findings were two common moves in the Results section (Poteguillo, 1999; Yang & Allison, 2003; Nwogu, 1997; Kanoksilapatham, 2005). These two variations appear to be shared by RAs in the field of hard sciences (medicine and computer science) or soft sciences (applied linguistics).

Altogether, 4 moves were found in the Discussion section. The function of Move 13, Step 3: *Restating the aims of the study* is shown by the results of Dudley-Evans's (1994) study. She identified an information move (background about theory/research aims/methodology) in the Discussion section. This step mirrors the purpose of Move 3: *Introducing the present study* found in the Introduction section before interpreting selected findings. But Kanoksilapatham (2005) did not find this step in her study. Move 14, Step 5: *Making overt claims or generalizations* was an obligatory step, 30 RAs having this step, meanwhile the frequency of occurrence of Move 14, Step 3: *Referring to previous literature* was not 100%. Extensive occurrence of Move 14, Step 5: *Making overt claims or generalizations* indicates that science writers prefer to spend much more time explaining their own results than referring to the results of others. Move 15, Step 4: *Limitations of previous studies* was a new step in the present study, which was not found in previous studies (Nwogu,

1997; Dudley-Evans, 1994; Holmes, 1997; Posteguillo, 1999; Yang & Allison, 2003; Kanoksilapatham, 2005).

5.2 Lexical Bundles in Agricultural Science Research Articles

Previous studies compared the use of lexical bundles between published writing and students' writings in different fields (Conrad, 1996; Hewings & Hewings, 2002; Corts, 2004) or investigated the use of lexical bundles in speaking or writing (Biber, Johansson, Leech, Conrad, and Finegan, 1999; Biber & Barbieri 2007). Little attention has been paid to analyzing the function of lexical bundles in RAs in different disciplines. The primary objective of the present study was to identify the rhetorical moves of Agricultural Science RAs, and to examine the possible lexical bundles related to each move in an agricultural context. The lexical bundles identified in the present study perform communicative functions. The following sections will present the identified lexical bundles in two groups.

5.2.1 Same Lexical Bundles with Different Functions Occurring in Different Moves

It should be noted that 14 lexical bundles were found to have more than one function. Table 5.1 shows the distribution of these lexical bundles.

Table 5.1 List of Lexical Bundles with More than One Function

Lexical Bundles	Moves/Steps
has been shown to have been shown to	Move 1, Step 3: <i>Reviewing previous research</i> (Introduction) Move 13, Step 1: <i>Stating what is already known from previous studies</i> (Discussion) Move 14, Step 3: <i>Referring to previous literature</i> (Discussion)
has been well documented It is well documented that	Move 1, Step 3: <i>Reviewing previous research</i> (Introduction) Move 12, Step 3: <i>Evaluating the current findings against those from previous studies or with regard to the hypothesis</i> (Results) Move 14, Step3: <i>Referring to previous literature</i> (Discussion)
It was assumed that	Move 8, Step 2: <i>Detailing assumptions for the model</i> (Methods) Move 9, Step 2: <i>Making hypotheses</i> (Results)
can be caused by	Move 1, Step 2: <i>Making topic generalizations</i> (Introduction) Move 14, Step 4: <i>Explaining differences in findings</i> (Discussion)
It is known that	Move 1, Step 1: <i>Commenting on the importance of the topic</i> (Introduction) Move 14, Step 3: <i>Referring to previous literature</i> (Discussion)
has been detected in	Move 1, Step 3: <i>Reviewing previous research</i> (Introduction) Move 14, Step2: <i>Stating selected findings</i> (Discussion)
have been identified in	Move 1, Step 3: <i>Reviewing previous research</i> (Introduction) Move 12, Step 3: <i>Evaluating the current findings against those from previous studies or with regard to the hypotheses</i> (Results)
It is not clear whether	<i>Move 2: Indicating a research gap</i> (Introduction) <i>Move 13, Step 2: Detailing conclusions based on analyses from previous studies</i> (Discussion)
Little is known that	<i>Move 2: Indicating a research gap</i> (Introduction) Move 14, Step 3: <i>Referring to previous literature</i> (Discussion)
was positively related to	Move 12, Step 2: <i>Making generalizations or interpretations of the results</i> (Results) Move 14, Step 2: <i>Stating selected findings</i> (Discussion)
It has been shown that	Move 13, Step 1: <i>Stating what is already known from previous studies</i> (Discussion) Move 14, Step 3: <i>Referring to previous literature</i> (Discussion)
It was shown that	Move 14, Step 2: <i>Stating selected findings</i> (Discussion) Move 14, Step 3: <i>Referring to previous literature</i> (Discussion)

It was worth noting that 10 out of 14 lexical bundles which were identified in the Introduction section were also found in the Discussion section. These results support the idea of Mišak, Marušić and Marušić's (2005) study that the Discussion section is a stylistic mirror image to the Introduction section. Authors first provide the summary of the most important results, proceed with a comparison of other similar studies and a clear recognition of the limitations of their study, and end up with the main conclusions and suggestions for further research into questions that have been left unanswered. The 14 lexical bundles will be discussed as follows:

Among them, 4 lexical bundles were found in 3 different moves, including, *has been shown to, have been shown to, has been well documented, It is well documented that*. For instance, the lexical bundles *has been shown to/have been shown to* were frequently found in Move 1, Step 3 and Move 13, Step 1, framing the review of literature relevant to the study. Found in Move 14 Step 3, they functioned to state specific discussion on results in the current study in terms of comparison with previous studies. Usually, these 2 lexical bundles were displayed by the following verbs: *cause, regulate, inhibit, increase, result in, decrease, improve* etc. This is illustrated as follows:

Examples: 1) *Increased plant diversity **has been shown to increase** soil respiration and microbial biomass because of increased net primary productivity (and therefore greater C inputs, Craine and Wedin, 2002; Zak et al., 2003).* (Move 1, Step 3: Reviewing previous research)

2) *Measurements related to oxidative stress Heat shock have **been shown to cause** oxidative stress that induces genes and promotes the synthesis of enzymes involved in oxidative stress defense (Morgen et al., 1986; Li et al., 1999). (Move 13, Step 1: Stating what is already known from previous studies)*

3) *In addition, in Arabidopsis, the NTS sequence **has been shown to activate** homologous recombination in nearby chromosomal regions (Urawa et al., 2001). (Move 14, Step 3: Referring to previous literature)*

The function of Move 12, Step 3: *Evaluating the current findings against those from previous studies or with regard to the hypothesis* and Move 14, Step 3: *Referring to previous literature* is very similar. The purpose of these 2 steps is to discuss specific results in the current study in terms of comparison with previous studies. Move 1, Step 3 frames *the review of previous studies*. That is, it only gives a review of the literature instead of comments on the results as in the current study. Therefore, the lexical bundles *has been well documented/It is well documented that* identified in Move 1, Step 3, Move 12, Step 3 and Move 14, Step 3 have two functions: to give a review of the literature or specific discussion on the results in the current study in terms of comparison with previous studies. Examples are shown as follows:

Examples: 1) *Salmonellas are commonly diagnosed in dairy cows and calves, and the presence of Salmonella on dairy farms **has been well documented** (Wells et al., 2001).*

(Move 1, Step 3: Reviewing previous research)

2) *It is well documented that* *Red Iberian pigs contributed to the development of Diocese, the original name of the Duroc breed (Jones 1998).* (Move 12, Step 3: Evaluating the current findings against those from previous studies or with regard to the hypotheses)

3) *Modulation of transcription by insect-derived elicitors has been well documented for chewing herbivores and more recent evidence suggests a similar mechanism by sap-feeding insects.* (Move 14, Step 3: Referring to previous studies)

In addition, another 10 lexical bundles were identified in 2 different moves, including *It was assumed that, can be caused by, It is known that, has been detected in, have been detected in, It is not clear whether, Little is known about, was positively related to, It has been shown that* and *It was shown that*. These lexical bundles were found to have 2 functions as in following examples:

Examples: 1)-a *It was assumed (27) that* *c, Pp, and R were uncorrelated.* (Move 8, Step 2: Detailing assumptions for the model)

1)-b *It was assumed that* *the immediate increase in activity is due to the regulation of PLD protein.* (Move 9, Step 2: Making hypothesis)

2)-a *Syneresis and spontaneous rupture are macroscopic phenomena can be caused by three types of microscopic processes that are linked to the basic building blocks of protein gels.* (Move 1, Step 2: Making topic generalizations)

2)-b *Stegner et al. (2004) reported that the longer interval to estrus for MGA Selec treated cows can be caused by higher progesterone concentrations during*

the growth phase of the follicle and correspondingly lower E2 concentrations, a hormonal environment similar to the mid-luteal phase of the estrous cycle. (Move 14, Step 4: Explaining differences in findings)

3)-a **It is known that** *hPCs are formed by legume plants or cell suspension cultures when challenged with several metals and metalloids (Grill et al., 1986; Klapheck et al., 1995).* (Move 1, Step 1: State why the topic is important)

3)-b **It is known that** *LA can scavenge peroxy radicals in aqueous phase [22] and that it is the only form of lipoic acid able to react with singlet oxygen, forming thiosulfinates and thiosulfonates [3].* (Move 14, Step 3: Referring to previous literature)

4)-a *Furthermore, the mutation responsible for the cream phenotype **has been detected in** exon 2 of a gene known as membrane associated transporter protein (MATP) previously mapped to ECA21q (Locke et al. 2001; Mariat et al. 2003).* (Move 1, Step 3: Reviewing previous research)

4)-b *BMP-6mRNA expression **has been detected in** both neonatal pig ovaries [8] and granulosa cells and oocyte of the rat [4].* (Move 14, Step 2: Stating selected findings)

5)-a *Proteins with potential calmodulin-binding sites **have been identified in** both mitochondria and chloroplasts, and calmodulin binding to these proteins has been demonstrated in vitro (Buaboocha et al., 2001; Roberts et al., 1983; Yang and Poovaiah, 2000.* (Move 1, Step 3: Reviewing previous research)

5)-b Both species **have been identified in** other fermented plant material and are important for the acidification process (Kandler and Weiss, 1986; Hammes et al., 1992). (Move 12, Step 3: Evaluating the current findings against those from previous studies or with regard to the hypotheses)

6)-a **It is not clear whether** interfaces of mixed proteins show phase separation behaviour, although there is some evidence that this is possible on the air-water interface (Razumovsky & Damodaran, 2001). (Move 2: Indicating a research gap)

6)-b A particular feature of loquat ripening and senescence is the increase in fruit firmness, but **it is not clear whether** this is a postharvest phenomenon or occurring over a wider period of maturation. (Move 13, Step 2: Detailing conclusions based on analyses from previous studies)

7)-a **Little is known about** the mechanisms underlying the ability of the dog to determine direction from an odor trail. (Move 2: Indicating a research gap)

7)-b **Little is known about** the influence of Ni deficiency on amino acid metabolism. Ni deficiency in barley increased the pool of total free amino acids and nonprotein nitrogen compounds in shoots and seeds by 20% to 40% (Brown et al., 1990). (Move 14, Step 3: Referring to previous literature)

8)-a After weaning, ADG **was positively related to** the total amount of creep feed consumed during lactation ($r = 0.63$, $P < 0.001$). (Move 12, Step 2: Making generalizations or interpretations of the results)

8)-b *Weight gain and feed intake of the litters after weaning was positively related to creep feed intake during lactation.* (Move 14, Step 2: Stating selected findings)

9)-a *Furthermore, it has been shown that a Hsp70 protein resides in the inter membrane space (Marshall et al., 1990) and might be involved in protein import into chloroplasts (Becker et al., 2004).* (Move 13, Step 1: Stating what is already known from previous studies)

9)-b *It has been shown that increased mid life adiposity, demonstrated by triceps skin fold thickness, was associated with an almost threefold increase in risk of PD (Abbott et al., 2002).* (Move 14, Step 3: Referring to previous literature)

10)-a *Again it was shown that with a growing size of vegetation unit the fractal dimensions determined from root system associations of different sizes approach the mean of the isolated small wood (see Figures 6 and 9).* (Move 14, Step 2: Stating selected findings)

10)-b *It was shown that Alb3.1 can be coimmunoprecipitated with DI protein (Ossenbuhl et al., 2004).* (Move 14, Step 3: Referring to previous literature)

As can be seen, some lexical bundles bridge two structural units, including *has been shown to, have been shown to, can be caused by, has been detected in, have been identified in, and was positively related to.* In many cases, the last word of the lexical bundle is the first element of the second structure. Some lexical bundles reflect relationships between prior and coming discourse, including *It is well*

documented that, It was assumed that, It is known that, It is not clear whether, Little is known about, It has been shown that and It was shown that. They signal a new step in the procedure and complete new propositional information.

5.2.2 Same Lexical Bundles with the Same Function Occurring in Different Moves

Three lexical bundles were found to have the same function but occurring in different IMRD sections. The lexical bundles *These results showed that/These data showed that* were identified in Move 11: *Stating results* and Move 14, Step 2: *Stating selected findings*. They have the same function which is to state the current results or findings. Examples are shown as follows:

Examples: 1) **These results showed that** *the transition from mitotic cell division to cell expansion occurred earlier in the trn mutants (Figure 3F).* (Move 11: Stating results)

2) *In our study, **theses data showed that** MDAR and DHAR were highest in extracts from raspberries treated with MJ after storage for 7 days.* (Move 14, Step 2: Stating selected findings)

Another example is the phrase *This would imply that*. It was found in Move 12, Step 2: *Making generalizations or interpretations of the results* and Move 15, Step 5: *Making overt claims or generalizations*. The function of these 2 steps is similar, which is to state specific discussion on results as in:

Examples: 1) **This would imply that** *small changes in either could cause large changes in net uptake.* (Move 14, Step 5: Making overt claims or generalizations)

2) ***This would imply that*** a greater number of myelinated pro. les would increase the coverage of myelinated pro. les on a given area of tissue. (Move 12, Step 2: Making generalizations or interpretations of the results)

In sum, moves represent the writer's communicative purpose and perform specific functions; 4 moves perform the same functions in Agricultural Science RAs. For instance, Move 11 and Move 14, Step 2 realized a similar function, which is to state the current results, while Move 12, Step 2 and Move 14, Step 5 realized the same purpose, which is to present specific discussion of the results.

5.3 Summary

This chapter mainly discussed the results in response to two research questions. The results of the first research question indicate that the rhetorical structure of Agricultural Science RAs has its own format. The results of the second research question reveal that some lexical bundles perform more than one function, while some lexical bundles are found to have the same function but occur in different IMRD sections. Together, these results suggest that the lexical bundles which link linguistic features and convey functional content may help novice researchers or learners write Agricultural Science RAs more effectively.