DO APPLIED LINGUISTS AND MECHANICAL ENGINEERS REPORT RESULTS AND MAKE DEDUCTIONS FROM THEIR RESEARCH DIFFERENTLY?

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ABSTRACT

In this study, we investigated how authors in applied linguistics and mechanical engineering report results in their papers and make deductions from their research and whether these practices are different in the two disciplines by drawing on a corpus of thirty-six journal articles. We identified segments that perform the functions of reporting results and making deductions in the papers using Swales's (1990, 2004) conceptual framework of rhetorical move. We then explored a range of salient linguistic features associated with the moves using the data-driven approach (Rayson, 2008). More specifically, we made keyness comparisons at the part-of-speech (POS) level to identify grammatical categories that are characteristic of the moves in each discipline. We further examined the concordance of the significant POS domains qualitatively to explore underlying meanings and functions behind the linguistic mechanism. These functional and grammatical-rhetorical analyses showed that the way that applied linguists and mechanical engineers report results and make deductions from their research follows the universal characteristics of the academic world, but at the same time, reflects the knowledge-making conventions inherent in each disciplinary community. Pedagogically, the findings can provide a useful resource for producing activities for writing instruction to raise learners' awareness of typical rhetorical norms in their field of research, and guide them in formulating structures appropriate for communicative functions.

Key words: Applied Linguistics; Mechanical Engineering; move analysis; data-driven approach; research articles

1. INTRODUCTION

As each discipline establishes its own conventions of making knowledge (Becher, 1989; Swales, 1990), those who wish to participate successfully in a particular disciplinary community are expected to demonstrate a good command of inquiry norms and cultural practices accepted in their field. Writing academically can therefore be challenging, especially for novice writers who lack knowledge of discipline-defined rhetorical conventions. In the context of English having become an international language and texts written in English being considered a main channel of disseminating scientific knowledge (Hyland, 2015), the challenge can be greater for non-native English researchers. It is thus important to make explicit for prospective members appropriate discipline-specific expectations.

Research into academic discourse in the last three decades has elucidated a variety of rhetorical features specific to particular disciplines to enhance learners' awareness of disciplinary conventions and enable them to produce effective communication. Among academic genres, the research article (RA) has attracted great attention as it is a major channel of spreading new knowledge within an academic context (Basturkmen, 2012; Peacock, 2002; Yang & Allison, 2003). A range of features of the research article have been examined to uncover epistemic principles of different disciplines. Schematic features have been explored using various approaches, most notably Swales's (1990, 2004) move analysis, which characterises the organisational pattern of a particular RA section as a series of moves and steps defined as discoursal units performing specific communicative functions.

A multitude of studies have adopted Swales's approach to explore move structure and its linguistic correlates in RAs from a range of disciplines (e.g. Basturkmen, 2009, 2012; Brett, 1994; Lim, 2012). In addition to organisational patterning, rhetorical-grammatical features have been analysed in RAs such as citation, tense usage, stance expressions, and phraseological phenomena.

Cross-disciplinary research has been also conducted to yield important information on similarities and/or differences between/among disciplines or broad disciplinary grouping with regard to the two main areas (1) move structure (e.g. Peacock, 2002; Yang & Allison, 2003), and (2) linguistic use (Hyland, 1998; Salager-Meyer, 1994). Among these studies, only a few (e.g. Pho, 2013) have probed variation in terms of language use that is

associated with a particular rhetorical move. Pho (2013), for instance, examined stance features across the moves in applied linguistics and educational technology RAs. One difference she found was that when introducing their present work, applied linguistics researchers used the modal verb *will* more often while educational technology writers used *would* more commonly (Pho, 2013, p. 111).

Our previous study (Le & Pham, 2021) addressed the dearth of research in this strand by examining the linguistic realisations of the commentary move in RAs in two disciplines representing the soft-hard distinction: applied linguistics and mechanical engineering using Swales's framework of move analysis and Rayson's (2008) data-driven approach. The study revealed both convergences and divergences in the linguistic use. As an example, although the present simple form of lexical verbs were featured in both applied linguistics and mechanical engineering RAs, different members of this grammatical category were selected by authors in the two disciplines. While positive weak verbs like *suggest* were salient in applied linguistics RAs, positive strong verbs such as *signifies, shows, demonstrates* tend to characterise mechanical engineering ones. Our current research extends this line of inquiry to provide further insights into genre practices embedded within RAs from the two disciplines with a focus on two moves: Report-results and Make-deductions. These rhetorical functions have been identified as important in academic articles where researchers present findings to establish new knowledge territories and make suggestions or implications in view of their findings to assert contributions of their studies. Our study examines two research questions:

1. How are the functions of reporting results and making deductions from research findings realised linguistically in RAs in the two selected disciplines?
2. Are there any differences in the linguistic characterisation of these rhetorical functions between RAs in applied linguistics and those in mechanical engineering? If so, how can the differences be explained?

2. METHODOLOGY

To address the two research questions, we adopted an integrated methodology featuring various approaches including corpus linguistics, move analysis and discourse analysis. We first built a corpus, which is a collection of RAs. We then conducted a move analysis of the RAs to identify segments that report results and make deductions from research findings. In the next

stage, we adopted a data-driven approach to explore how these functions are linguistically characterised and performed further contextual analyses of the salient features to provide more comprehensive linguistic descriptions. The sub-sections that follow describe procedures for selecting RAs for the corpus and details the methods of analysis.

2.1. The corpus

2.1.1. Selection of journals and research articles

We selected forty RAs that are equally distributed between the two disciplines: applied linguistics (AL) and mechanical engineering (ME). As the Report-results move and the Make-deductions move occur in the Results and closing sections of RAs, we took into account the overall structure of these sections. According to a survey by Lin and Evans (2012), the most common macro-structure for applied linguistics RAs is a standalone Results section, followed by a combined Discussion-Conclusion section or an independent Discussion and a Conclusion section, whereas that for mechanical engineering is an integrated Results-Discussion section, followed by a Conclusion section. Nineteen AL articles and seventeen ME articles fell into this classification, and thus these thirty-six articles were included in our corpus to avoid any possible variation caused by differences in the overall structure within the same discipline. The remaining sections after the Results in the AL articles (either independent or hybrid Discussion and Conclusion sections) are labelled as 'Discussion-Conclusion section'.

2.1.2. Corpus components

A list of the RAs selected for the corpus can be found in the appendix. Table 1 outlines the constituents of the corpus used for move analysis.

Table 1. *Components of the corpus.*

Disciplines	No. of RAs	Sections	No. of tokens
Applied linguistics (AL)	19	Results (R)	33,278
		Discussion-Conclusion (DC)	39,439
Mechanical engineering (ME)	17	Results-Discussion (RD)	36,541
		Conclusion (C)	5887

2.2. Methods of analysis

In the first stage, we identified text segments that perform the functions of reporting results and making deductions using the analytical scheme developed from previous models (e.g. Basturkmen, 2009, 2012; Brett, 1994; Pho, 2013; Yang & Allison, 2003). The analytical framework is summarised in Table 2. In the second stage, we identified salient linguistic features associated with the moves using the web-based tool *Wmatrix* (Rayson, 2008) and the software *AntConc* (Anthony, 2018). The procedure for the identification of moves and their linguistic mechanism adopted in this study has been described in detail in our previous study (Le & Pham, 2021).

In general, we imported into the qualitative analysis software *Nvivo* all the article text files and the analytical framework. We read each article closely, divided it into discoursal units using the segmentation protocol (as illustrated in Table 3), and labelled the segments that report results and make deductions with the move names. The first author analysed AL articles while the coding of ME articles was done collaboratively by the two authors as the second one has domain knowledge in the mechanical engineering discipline. To ensure the reliability of coding, we coded the whole corpus twice, yielding high Cohen's kappa coefficients for individual sections (0.97 and 0.96 for AL, and 0.99 and 0.98 for ME). We annotated the segments coded at the moves with part-of-speech (POS) tags and made keyness comparisons to identify grammatical features that are salient in the moves. Finally, we examined concordances of the significant POS domains – those with a log likelihood (LL) value of 6.63 or over – to provide more detailed descriptions of the linguistic mechanism.

Table 2. *Analytical framework.*

Rhetorical functions	Detailed explanations of the function
Report results	The researcher provides a direct and brief statement of the results.
Make deductions from the findings	The researcher extends beyond the results by suggesting what can be done to solve the problems identified by the research or what should be the best practice or application in view of the findings. The researcher also points out areas/issues that need future research or draws pedagogic implications.

Table 3. *Segmentation scheme*

Basic unit of analysis	Segmentation rules	Examples from the corpus
The sentence with one overall communicative function and without other specific functions	**One tag** for the whole sentence	**<Make deductions>** Thus, if the comparison of feedback strategies was to be approached in future studies, the inclusion of a control group would be highly advisable. **</Make deductions>** [AL13]
The sentence with one overall communicative function and with other specific functions	**One tag** for the whole sentence **Additional tags** for other elements of the sentence	**<Report results>** Overall however it is notable that the analysis of change and consistency between the two tests produced three highly consistent data sets across the three different option number format groups, **<Interpret results>** suggesting once again that the number of options in a multiple choice item is a matter of little significance in the measurement of language based constructs **</Interpret results>**. **</Report results>** [AL7]

3. RESULTS AND DISCUSSION

3.1. Range and length of the results-reporting move and deductions-making move

This sub-section illustrates the representation of the Report-results and the Make-deductions moves in the Results and closing sections of AL and ME articles by demonstrating how many articles each move occurs in (i.e. the range) and how much space it takes up in the section (the length). As can be seen from Figures 1-2, the Report-results move occurs in all the R/RD sections of AL and ME articles (ALr and MErd), and takes up a large amount of space (more than half) in these sections. This move is also present in all DC sections of AL articles (ALdc), but is given less space (just about 25%) probably because reporting results is not the main function of this section, which is often devoted to discussing findings (Yang & Allison, 2003). The Report-results move occurs in only 25% of Conclusion sections of ME articles (MEc) and takes up less than 5% of this section.

While the Make-deductions move is present in the majority of the DC sections of AL articles (ALdc), it occurs in less than 50% of the Conclusion sections of ME articles (MEc). This rhetorical function takes up more space in AL than ME articles although its coverage is not prominent in both sub-corpora.

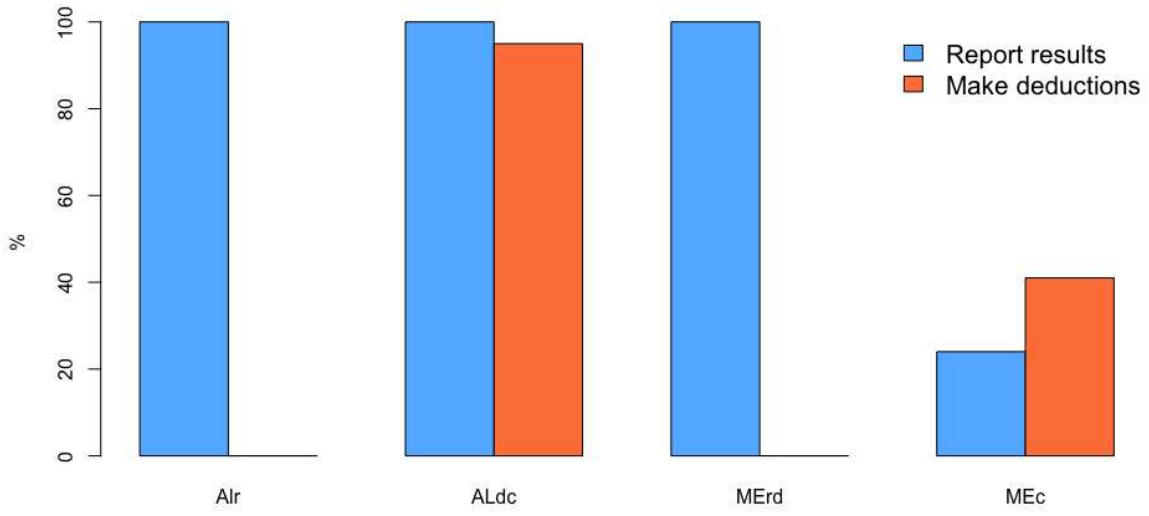

Figure 1. *The range of the Report-results move and the Make-deductions move*

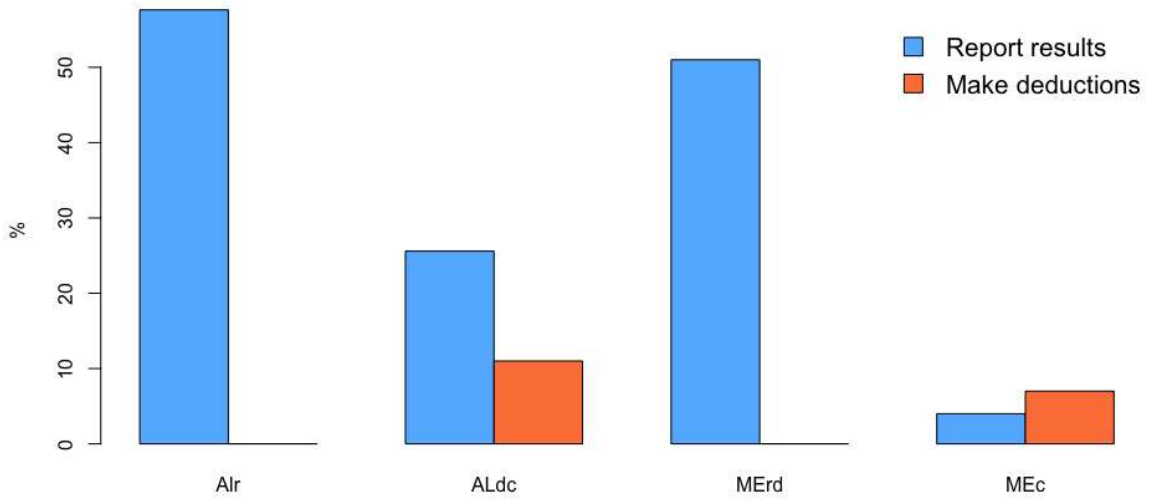

Figure 2. *The length of the Report-results move and the Make-deductions move*

3.2. Linguistic realisations of the Report-results and the Make-deductions moves

This sub-section presents and compares the linguistic realisations of the Report-results move and the Make-deductions move in the R/RD/DC/C sections of ME and AL articles. Patterns are presented when possible following these conventions. The element in bold is the centre of the pattern, serving as the basis for identifying co-occurring elements. Words in capital letters denote the semantic field of the phrase.

The grammatical features (significant POS tags) are related to one another in various ways, through co-selection patterns, and many POS tags are not rhetorically significant under contextual examination (e.g. tag AT for articles like *a, no*). Thus, not all grammatical categories were examined and presented. POS tags characteristic of the two rhetorical functions are shown in Table 4, followed by their meanings and examples.

Table 4. *POS tags characteristic of the functions examined in the corpus*

POS tags	Meaning
VM	Modal verb (*may*)
VVI	Infinitive (*provide*)
TO	Infinitive marker (*to*)
VBI	Infinitive *be*
VVZ	*-s* form of lexical verb (*indicates*)
VHD	had
VBDZ	was
VBDR	were
VVD	Past tense of lexical verb (*indicated)*
VBR	are
VBZ	is
VBG	being
VDD	did
JJ	General adjective (*different*)
JJR	General comparative adjective (*higher*)
JJT	General superlative adjective (*highest*)
RGR	Comparative degree adverb (*more, less*)
RRR	Comparative general adverb (*better*)
CSN	*than* as a conjunction

CST	*that* (as conjunction)
PPH1	3rd person singular neuter personal pronoun (*it*)
EX	Existential *there*
DA1	Singular after-determiner (*little, much*)
DB	Before-determiner (capable of pronominal function) (*all, half*)
DB2	Plural before-determiner (capable of pronominal function) (*both*)
NN	Common noun, neutral for number (*means*)
NN1	Singular common noun (*effect*)
NN2	Plural common noun (*papers*)
II31	Preposition in the first position of a sequence of 3 elements (*in terms of*)
IO	*of* (as a preposition)
CSA	*as* (as conjunction)
CSW	*whether* (as a conjunction)
CCB	Coordinating conjunction (*but*)
RR	General adverb (*somewhat*)
RG	Degree adverb (*about*)
RRQ	wh- general adverb (*when*)
FO	Formula (*2006b*)
MC	Cardinal number (*1998*)
MC1	Singular cardinal number (*one*)
ZZ1	Singular letter of the alphabet (*A, b*)
AT	Article (*the, no*)
NNU	Unit of measurement, neutral for number (*in., cc.*)

3.2.1. In the Results and the Discussion-Conclusion sections of the Applied Linguistics research articles

Table 5. *Salient grammatical features of the Report-results move in the Results section and the Discussion-Conclusion section of the AL RAs*

In the Results section						In the Discussion-Conclusion section					
POS	Report results		Other moves		LL		Report results		Other moves		
	Freq.	Rel. Freq.	Freq.	Rel. Freq.		POS	Freq.	Rel. Freq.	Freq.	Rel. Freq.	LL
ZZ1	421	2.01	56	0.35	225.11	VVD	263	2.38	272	0.87	128.37
FO	1004	4.79	460	2.88	85.41	VBDZ	118	1.07	115	0.37	63.05
CSN	113	0.54	19	0.12	50.92	AT	901	8.14	1938	6.22	43.3
JJR	140	0.67	32	0.2	46.8	VBDR	91	0.82	104	0.33	37.53
CST	226	1.08	80	0.5	38.3	CSN	54	0.49	63	0.2	21.45
VVD	482	2.3	226	1.42	37.8	VDD	34	0.31	32	0.1	19.1
NNU	155	0.74	46	0.29	36.31	ZZ1	30	0.27	30	0.1	15.42
RGR	69	0.33	13	0.08	28.16	JJR	96	0.87	168	0.54	13.17
RR	578	2.76	316	1.98	22.86	NNU	19	0.17	16	0.05	12.36
DB	52	0.25	10	0.06	20.82	VBG	20	0.18	18	0.06	11.95
NN	114	0.54	40	0.25	19.68	EX	32	0.29	43	0.14	9.51
II31	62	0.3	15	0.09	19.37	VHD	30	0.27	42	0.13	8.09
NN2	1887	8.99	1231	7.72	17.65	DA1	9	0.08	6	0.02	7.57
VDD	61	0.29	16	0.1	17.16	FO	394	3.56	940	3.01	7.51
JJT	51	0.24	13	0.08	14.91						
DB2	48	0.23	12	0.08	14.39						
MC	1461	6.96	963	6.04	11.95						
VBDZ	237	1.13	124	0.78	11.77						
EX	58	0.28	19	0.12	11.45						
AT	1655	7.89	1113	6.98	10.1						
JJ	1651	7.87	1136	7.12	6.75						
RG	65	0.31	28	0.18	6.74						

The first salient feature used to report results in the Results section of AL articles is the comparative and superlative expressed through the tags CSN (*than*), JJR, RGR, and JJT (see Table 5). The most frequent comparative adjectives (tag JJR) include *higher* (54 occurrences) and *lower* (41). Their superlative forms (JJT) *highest* (15) and *lowest* (10), together with *largest* (12) are also frequent in this move. Two comparative degree adverbs (RGR) are *more* and *less*, with *more* being more frequently used. It is obvious that results reported in AL articles are related to comparison between two groups, among groups (Example 1), or against a standard (Example 2).

(1) It was found that, … the mean response is significantly *higher* for interact at a = .05. (AL2r)

(2) The results of the factor analysis produced six factors with eigenvalues *greater* than 1, …. (AL12r)

The second prominent feature is the past tense, marked by the tags VVD, VDD (*did*), and VBDZ (*was*). The most frequent lexical verbs in the simple past tense (tag VVD) are reporting verbs including *showed* (33 occurrences), *indicated* (26), and *revealed* (22).

(3) The univariate analysis *revealed* no significant effects …. (AL1r)

These reporting verbs frequently co-occur with *that* as a conjunction, marked by the tag CST. The prevalence of *that*-complement clauses is in line with the general finding from previous studies that the complement *that*-clause is a common feature in academic writing (Le & Harrington, 2015; Pho, 2013). In addition to past reporting verbs, the *that*-complement clause also collocates with reporting verbs in other forms, as illustrated in the patterns below:

Pattern 1:

SPECIFIC STATISTICAL RESULT noun group	+	Simple past REPORTING verbs	+	*that*-clause
The descriptive statistics the results of a t-test analysis		indicated (18) revealed (14) showed (12)		that there was no significant difference in ...

Pattern 2:

GENERAL RESULT noun group	+	Present simple REPORTING verbs	+	*that*-clause
results data		*show* (9) suggest (5)		that higher level students were less affected than lower level ones

Pattern 3:

which as a connector/STATISTICAL TEST INDICATOR noun group	+	Present simple REPORTING verbs	+	*that*-clause
The results of the analysis revealed that there was a significant Time Treatment interaction …, which		indicates (9)		that the groups performed differently ...
The highly significant positive intercept				

As these constructions show, the reporting verbs favour different tenses as well as different types of subject to fulfil different purposes in various situations. The past tense is used when writers present a specific result obtained directly from a statistical test (Pattern 1). In contrast, the present simple tense is preferred when writers make some generalisations from statistical tests (Pattern 2), provide written statements for a result (Pattern 3), or explain the meanings of a number from statistical tests (Pattern 3). Subjects of these verb collocates are non-human, showing that writers have a tendency to take an objective stance in reporting results.

The third noticeable feature is the frequent use of singular common nouns (NN2), most of which are associated with research topics in applied linguistics. One research noun *results* (35 occurrences) is found in this move, and collocates most frequently with *show* (7 times), which is also indicated in Pattern 2. The final salient feature in the Report-results move is existential *there* (EX), the most significant right collocates of which include *no* (22 occurrences), *differences* (16), *significant* (28), *was* (31), and *were* (21). Again, this shows that results reported here are mainly related to comparisons between/among groups.

The Report-results move in the Discussion-Conclusion section of AL articles has the linguistic profile including features characterising the function in the Results section, such as the simple past tense, comparison language, and existential there (EX) collocating most frequently with *correlation* (7 occurrences), *large* (6), *no* (9), *difference* (6), *significant* (9), *between* (9), *was* (20), and *a* (17). These features indicate that like the Results section, the reporting of results in this closing section is mainly concerned with comparing different groups or features.

(4) The *higher* level students *performed* slightly *better* in the oral mode *than* on the written items. (AL3dc)

3.2.2. In the Results-Discussion and the Conclusion sections of the Mechanical Engineering research articles

Table 6. *Salient grammatical features of the Report-results move in the Results-Discussion section and the Conclusion section of the ME RAs*

In the Results-Discussion section						In the Conclusion section					
POS	Report results		Other moves		LL	POS	Report results		Other moves		LL
	Freq.	Rel. Freq.	Freq.	Rel. Freq.			Freq.	Rel. Freq.	Freq.	Rel. Freq.	
RR	622	2.81	365	1.73	56.22	VVZ	20	2.49	58	0.91	175.05
RG	85	0.38	21	0.1	38.49	FO	36	4.49	167	2.61	71.94
JJR	252	1.14	134	0.63	31.35						
CSN	100	0.45	34	0.16	30.96						
IF	273	1.23	171	0.81	19.12						
FU	60	0.27	21	0.1	17.8						
PPH1	133	0.6	70	0.33	17.04						
CST	180	0.81	112	0.53	12.96						
RRR	48	0.22	18	0.09	12.78						
VVZ	365	1.65	265	1.25	11.61						
VBDZ	166	0.75	109	0.52	9.39						
CCB	33	0.15	13	0.06	8.08						
JJT	27	0.12	10	0.05	7.34						

The Report-results move in the Results-Discussion section of ME articles is predominated by the use of general adverbs (RR) (see Table 6). The most frequent adverbs (occurring more than 10 times) include linking adverbials (*also, moreover, therefore, however, nevertheless*), degree adverbs (*almost*, *much, slightly, relatively, significantly, about, approximately*), limitation stance adverbials (*mainly*), source of knowledge adverbials (*clearly*), and other modifying adverbs (*respectively, well, both, only* and *fully*). Other degree adverbs (RG) are also common in this move, including *very* and *around*. The prevalence of many different types of adverb indicates that results presented in the ME articles tend to relate to descriptions of a particular phenomenon and its behaviours and properties based on the contents of a figure or table. Of particular note here is the pervasiveness of degree adverbs or attribute hedges. According to Hyland (1998, p. 362), these devices, when used in hard-knowledge fields like mechanical engineering, do not express writers' doubt or uncertainty on the claim made; rather, they show writers' awareness of the importance of indicating the limit of the claim or its generalisability and the extent to which their results fit or deviate from the unspoken standard that is commonly assumed in their discourse community .

(5) In canyons …, the vertical velocity is *mainly* positive. (ME5rd)

Another salient feature is the comparative and superlative form of adjectives and adverbs, marked by tags JJR, RRR co-occurring with *than* (CSN) and JJT. The most frequent comparative adjectives (JJR) are *higher* (79 occurrences), *larger* (41), *lower* (33), *smaller* (31) and *taller* (15); comparative adverbs (RRR) include *faster* (9) and *higher* (7); and superlative adjectives (JJT) include *largest* (11). It is evident that results reported in ME articles are related to comparison between/among groups or situations.

(6) For B = 0.5, … the steady-state outlet velocity <equation> was slightly *higher* than that of its inlet counterpart …. (ME6rd)

Of particular note is the prevalence of the present simple tense (VVZ), along with the past tense of *be* realised by VBDZ (*was*). Contextual analyses reveal different usage of these tenses; the present simple tense is used to describe a process/phenomenon outlined in a figure/diagram or occurring in experiments (Example 7), while the past tense of *be* is used to report the specific values of parameters (Example 8).

(7) In contrast, the temperature *decreases* downward …. (ME1rd)

(8) The corresponding reduced frequency F+ *was* 1, 2, 3, and 5, respectively. (ME2rd)

The Report-results move in the Conclusion section of ME articles is characterised by lexical verbs in the present simple form (VVZ), which are used to describe a process or a behaviour.

(9) For both HTF injections, PCM first *melts* at the top of the exchanger …. (ME9c)

3.2.3. In the Discussion-Conclusion section of the Applied Linguistics research articles

Table 7. *Grammatical features characteristic of Make-deductions move in the Discussion-Conclusion section of the AL RAs*

POS	Make deductions		Other moves		LL
	Freq.	Rel. Freq.	Freq.	Rel. Freq.	
VVI	166	3.39	627	1.81	45.63
VM	117	2.39	387	1.12	44.99
TO	114	2.33	440	1.27	29.44
VBI	69	1.41	222	0.64	28.22
CSW	17	0.35	33	0.1	15.66
RRQ	17	0.35	35	0.1	14.56
VBR	34	0.69	127	0.37	9.64
MC1	23	0.47	75	0.22	9.13
VBZ	58	1.18	274	0.79	7.17
NN2	472	9.63	2925	8.43	6.99
IO	192	3.92	1102	3.18	6.86

Table 7 presents the linguistic features realising the Make-deductions move in the Discussion-Conclusion section of AL articles. To set directions for future research, authors use modal verbs (VM), the most frequent of which is *should*, followed by *may, would, could*, and *can*. The most frequent collocates of this category are other salient features including *be* (VBI), the infinitive (VVI), the infinitive marker *to* (TO), and other words such as *research, it, future*. Also collocating with the infinitive marker *to* is the present form of *be*: *are* (VBR) and *is* (VBZ). The conjunction *whether* (CSW) and *wh*-general adverbs (RRQ) also frequently co-occur with some of the infinitives in places where researchers make suggestions for future studies.

(10) It would also be interesting to compare … in order *to examine how* IPOA ratings …. (AL15dc)

(11) To limit the amount of reading …, sentence or phrase length and vocabulary level *should be* controlled. (AL3dc)

Many patterns emerge from the co-selection of these salient features.

Pattern 1:

future +	RESEARCH noun group +	Modal verb +	Infinitive
	research studies/study	should will might	take steps to minimize need to identify

Pattern 2:

future +	RESEARCH noun group +	NECESSITY verb group +	Infinitive
	research study	is needed is warranted needs	to examine to adopt

Pattern 3:

It is +	Adjective/noun +	(for + RESEARCH noun group) +	Infinitive
	NECESSITY: necessary/important/of paramount significance USEFULNESS: useful, instructive JUDGEMENT: interesting, best, illuminating EPISTEMIC: *possible*	for future research	to ensure to look into

3.2.4. In the Conclusion section of the Mechanical Engineering research articles

Table 8. *Grammatical features characteristic of the Make-deductions move in the Conclusion section of the ME RAs*

POS	Make deductions		Other moves		LL
	Freq.	Rel. Freq.	Freq.	Rel. Freq.	
MC1	16	2.91	29	0.43	28.71
VBI	11	2	31	0.46	13.44
TO	12	2.19	38	0.56	12.9
VM	12	2.19	41	0.61	11.78
VVI	15	2.73	67	0.99	10.03
JJR	13	2.37	64	0.95	7.33

As shown in Table 8, the linguistic feature typically used to make deductions is *be* (VBI), co-occurring with another salient feature – modal auxiliaries (VM) including *should*, *may*, *would*, *will*, each occurring 3 times. Along with these features is the salience of the infinitive (VVI). Comparative adjectives (JJR) also occur frequently, with *further* being the most frequent. These features altogether enable researchers to point out possible directions for future research.

(12) *Better* knowledge of the specific heat of the PCM *would* improve the discharging mode results …. (ME9c)

3.3. Unity and variability in linguistic choices

The linguistic descriptions of the Report-results and the Make-deductions moves in applied linguistics and mechanical engineering RAs highlight both similarities and differences in the way that researchers in the two disciplines use linguistic features to fulfil their communicative purposes. This information is summarised in Table 9. One point of convergence is that when reporting results, researchers in both disciplines use comparison adjectives and adverbs very frequently to compare different situations or objects. Furthermore, they use *should* more commonly than other modal verbs to make deductions from their research.

Despite the similarities, there are significant differences in the linguistic characterisation of the two rhetorical functions in the two disciplines. The most obvious distinction is that ME authors favour the present simple tense while AL researchers prefer the simple past tense when reporting results. This difference is due to the nature of research undertaken in the two disciplines. What is presented in ME articles is based on experiments conducted on real objects or samples, and therefore tends to reflect reality. The use of the present simple tense helps writers maintain the factuality of what is described in their study. In contrast, research in the field of applied linguistics mainly concerns itself with solving language-related problems. Results from this kind of research tend to vary according to contexts and participants. It is more appropriate to present these results using the past tense to refer to what happened in a particular circumstance. In addition, the Report-results move in the Results section of AL articles is particularly expressed through existential *there*, and the simple past of positive controlling verbs (positive strong: *show,* positive weak: *reveal, indicate*) with non-human subjects. These features enable writers when reporting results to

distance themselves from their study, and simultaneously place an emphasis on findings of their research (Pho, 2013, p. 137).

Moreover, ME writers typically use general adverbs to report results in the Results-Discussion section, while this feature is not used by AL researchers to fulfil the same function. Of particular note is the salience of attribute hedges such as *relatively, significantly, approximately, mainly*, *clearly*. This feature further adds an interpersonal dimension to the practice of reporting results, and, as we have argued, serves the rhetorical purposes appropriate in mechanical engineering, and reflects the disciplinary conventions regarding knowledge contexts and knowledge claims. To report results in the Results-Discussion section, ME authors are more likely than AL researchers to use modal verbs, the most frequent of which is the possibility/ability modal verb *can*, and exclusively use *it*-extraposition, co-occurring with *can* and *that*-clause. The use of *it*-extraposition has been considered to be a strategic means by which writers involve themselves in academic communication while remaining objective (Zhang, 2015). These lexico-grammatical features form different n-grams, including *it can be seen that, it can be clearly seen that, it can be observed that, it can be noted that*. Most of these sequences function as metadiscoursal expressions that help writers draw readers' attention to a particular result or point of interest when reporting results.

In AL articles, the *that*-complement clause following different forms of reporting verbs (*shows, found, indicating, indicated, suggesting, show, revealed, showed, indicates*) is prevalent in the Report-results move in the Results section. This feature, however, is not so prominent in ME articles. One interesting point here is that the present participle of lexical verbs (*indicating*, *suggesting*) followed by *that* is very typical of AL articles. An examination of concordance lines of these *–ing* verbs points to the phenomenon of move embedding created by compacting more than one piece of information into a single sentence. The *–ing* part is used to report results, or make interpretations based on results (Example 13).

(13) …, there was no significant variability among raters …, *suggesting* that rater experience is the main factor that accounts for differences …. (AL4r)

The second thing to note is that there are differences in the linguistic choice in a particular grammatical category even when the same move in the two disciplines shares this category. The most discernible difference was observed in the use of the present simple form of lexical verbs in the Report-

results move in the Conclusion/Discussion-Conclusion section. Although RAs in the two disciplines contain these verbs, they use very different categories of verb, which reflects the disciplinary research practices. While this move in ME articles is dominated by lexical verbs typical of research topics in mechanical engineering (e.g. *rotates, reaches, drops, stabilizes*), in AL articles, this move mainly consists of verbs used to make comments on results (e.g. *seems, indicates, suggests, remains, analyses, contradicts, means*). Concordance analyses of the verbs in AL articles reveal that these verbs are used to make interpretations based on results (Example 14), again showing the embedding of this function in the practice of reporting results.

(14) Interestingly, the only item … that did not indicate positive attitude was item 6 …, which *suggests* that while test-takers seemed to …, they did not seem to think that …. (AL8r)

Table 9. *The similarities and differences in the linguistic choices associated with specific rhetorical functions*

Rhetorical functions	The tendency for the linguistic choices to be made in the AL RAs	The tendency for the linguistic choices to be made in the ME RAs
Report results in the Results/Results-Discussion section	Comparison adjectives and adverbs	
	The simple past of positive controlling verbs (e.g. *show, reveal, indicate*) with non-human subjects	The present simple tense
	Existential *there*	General adverbs including attribute hedges
	that-complement clause controlled by reporting verbs in different forms	Modal verbs *can*, collocating with *it*-extraposition, and *that*-clause
	The present participle of lexical verbs (e.g. *indicating, suggesting*)	
Report results in the Discussion-Conclusion/Conclusion section	The present simple form of lexical verbs used to make interpretations based on results (e.g. *seems, indicates, suggests*)	The present simple form of lexical verbs typical of mechanical engineering research topics (e.g. *rotates, stabilises, reaches*)
Make deductions in the Discussion-Conclusion/Conclusion section	The modal verb *should*	

4. CONCLUSION

We have shown the universalities and differences in the way that applied linguistics and mechanical engineering authors realise the two rhetorical functions of reporting results and making deductions linguistically to make new knowledge claims. Our findings that linguistic choices are shaped by rhetorical purposes as well as epistemological characteristics of each discourse community have pedagogical importance. It is important to provide learners with information not only on how to organise their text to convey its communicative purpose, but also on which linguistic features to use to realise the rhetorical functions. The linguistic profile associated with the specific rhetorical functions in each discipline can serve as a useful resource for genre-based writing instruction to raise learners' awareness of rhetorical conventions that are generally accepted in their field and enable them to demonstrate their knowledge in their written texts. This small-scale study can be furthered by future studies that use larger corpora. They would allow the possibility to perform linguistic analyses on other moves and examine variation on other levels such as sub-discipline, research method or publication time.

REFERENCES

Anthony, L. (2018). *AntConc*. In (Version 3.5.7) [Computer Software]. Waseda University. http://www.laurenceanthony.net/software

Basturkmen, H. (2009). Commenting on results in published research articles and masters dissertations in Language Teaching. *Journal of English for Academic Purposes*, *8*(4), 241–251. https://doi.org/10.1016/j.jeap.2009.07.001

Basturkmen, H. (2012). A genre-based investigation of discussion sections of research articles in Dentistry and disciplinary variation. *Journal of English for Academic Purposes*, *11*(2), 134–144. https://doi.org/http://dx.doi.org/10.1016/j.jeap.2011.10.004

Becher, T. (1989). *Academic tribes and territories: Intellectual enquiry and the culture of disciplines* (Vol. null).

Brett, P. (1994). A genre analysis of the results section of sociology articles. *English for Specific Purposes*, *13*(1), 47–59. https://doi.org/http://dx.doi.org/10.1016/0889-4906(94)90024-8

Hyland, K. (1998). Boosting, hedging and the negotiation of academic knowledge. *Text*, *18*(3), 349–382. https://doi.org/10.1515/text.1.1998.18.3.349

Hyland, K. (2015). *Academic publishing: Issues and challenges in the construction of knowledge*. Oxford University Press.

Le, T. N. P., & Harrington, M. (2015). Phraseology used to comment on results in the Discussion section of applied linguistics quantitative research articles. *English for Specific Purposes*, *39*, 45–61. https://doi.org/http://dx.doi.org/10.1016/j.esp.2015.03.003

Le, T. N. P., & Pham, M. M. (2021). Discussing findings in Applied Linguistics and Mechanical Engineering research papers: A data-driven analysis of linguistic characterisations. *Asian ESP Journal*, *TBA in June 2021*(TBA in June 2021), TBA in June 2021.

Lim, J. M.-H. (2012). How do writers establish research niches? A genre-based investigation into management researchers' rhetorical steps and linguistic mechanisms. *Journal of English for Academic Purposes*, *11*(3), 229–245. https://doi.org/http://dx.doi.org/10.1016/j.jeap.2012.05.002

Lin, L., & Evans, S. (2012). Structural patterns in empirical research articles: A cross-disciplinary study. *English for Specific Purposes*, *31*(3), 150–160. https://doi.org/http://dx.doi.org/10.1016/j.esp.2011.10.002

Peacock, M. (2002). Communicative moves in the discussion section of research articles. *System*, *30*(4), 479–497. https://doi.org/http://dx.doi.org/10.1016/S0346-251X(02)00050-7

Pho, P. D. (2013). *Authorial stance in research articles: Examples from applied linguistics and educational technology*. Palgrave Macmillan.

Rayson, P. (2008). From key words to key semantic domains. *International Journal of Corpus Linguistics*, *13*(4), 519–549. https://doi.org/doi:10.1075/ijcl.13.4.06ray

Salager-Meyer, F. (1994). Hedges and textual communicative function in medical English written discourse. *English for Specific Purposes*, *13*(2), 149–170. https://doi.org/10.1016/0889-4906(94)90013-2

Swales, J. M. (1990). *Genre analysis: English in academic and research settings*. Cambridge University Press.

Swales, J. M. (2004). *Research genres: Explorations and applications*. Cambridge University Press. http://uq.summon.serialssolutions.com/link/0/eLvHCXMwY2BQMEk2TDJLs0yzNDdOSwYdHmOUbJJskWacaAQsGVPA-2AQMYpUmrsJMTCl5okySLu5hjh76JYWxkOHMOKTjMGrHc3MDcUYWlDd4lRxBtY0YPQAaWCRKQ7ULs7AEWFpFOQXYRkA4QrBuHrF4O1LeoUl4sASGhy7uoZ6pgBfCSbQ

Yang, R., & Allison, D. (2003). Research articles in applied linguistics: Moving from results to conclusions. *English for Specific Purposes*, *22*(4), 365–385. https://doi.org/10.1016/S0889-4906(02)00026-1

Zhang, G. (2015). It is suggested that…or it is better to…? Forms and meanings of subject it-extraposition in academic and popular writing. *Journal of English for Academic Purposes*, *20*, 1–13. https://doi.org/http://dx.doi.org/10.1016/j.jeap.2015.02.004