# Cross-disciplinary perspectives on research article introductions: The case of reporting verbs

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**Abstract**

*In academic writing, stance reporting is used to reflect the position of the writers towards the literature in order to establish the niche and value of the research. Cross-generic and cross-disciplinary studies of reporting verbs have been conducted on hard and soft disciplines, and yet the specific functions of reporting verbs in different sections of an academic genre across disciplines remain unexplored. This study examines and compares the use of reporting verbs in the introduction section of research articles published in high impact journals in the disciplines of psychology, radiology, and linguistics. A combination of the Create-a-Research-Space (CARS) model on analysing research article introductions by Swales and Feak (2004) and a functional taxonomy on reporting verbs by Hyland (2002) has been used to examine discipline-specific stance reporting constructions in the introduction sections of 142 research articles of the three disciplines. Findings suggest that the choice of reporting verbs is not only discipline specific but also depends on the section (and sub-section) in which such reporting verbs are employed.*

KEYWORDS: REPORTING VERBS, RESEARCH ARTICLE INTRODUCTIONS, CROSS-DISCIPLINES

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## 1. Introduction

In academic writing, stance reporting is used to reflect the position of writers towards the literature in order to establish the niche and value of the research. The context of academic writing is highly interpersonal and persuasive, where writers strategically choose potentially evaluative lexis to perform various functions, including expressing their attitudinal stance explicitly or implicitly, conveying their level of commitment towards propositions, and engaging appropriately with the readers (Gray & Biber, 2015).

In the academic genre of research articles (RAs), writers can use a variety of features, such as direct quotes, paraphrasing, integral and non-integral structures, to express their evaluation of the literature in order to establish the relevance and value of their research. An important linguistic form serving similar functions is the reporting verb (RV). RVs are used to refer to or cite prior research in RAs (Hyland, 2002); in particular, they are used by the RA writer to serve a few functions, including attributing propositional content to another source or to an author cited in the article, situating current research work in a larger disciplinary narrative, and performing interpersonal and rhetorical objectives in order to "rhetorically construct a community consensus" and "ensure that criticism stays within accepted bounds" (Hyland, 2002, p. 115).

The present study aims to compare in what ways, and to what extent, research journal writers from the disciplines of psychology, radiology, and linguistics use RVs across moves in RA introductions. Adopting an integration of the functional categories of RVs (Hyland, 2002) and the "Create-A-Research-Space" (CARS) model of RA introductions (Swales & Feak, 2004), it examines and compares move-specific distribution of the process functions and evaluative functions of RVs to find out how writers use RVs to take and present a stance towards the cited author's academic activities.

## 2. Literature review

In RAs, RVs are used by writers to explicitly signal their opinions and stances to the intended readers. They are considered a

metadiscursive element from the integrative perspective (also called 'interactive' or 'broader' perspective) which focuses on how the writer uses textual interaction (e.g., hedges and boosters, evaluation and stance) (Ädel, 2012; Mauranen, 2010). The integrative perspective concerns both interactional and interactive resources. Interactional resources are related to how the writer interacts with readers, and interactive resources to how the information is organised and delivered to readers (Hyland, 2017; Jiang & Hyland, 2016). In the classification of RVs in academic writing, apart from the seminal work done by Thompson and Ye (1991), Hyland's (2002) taxonomy (Figure 1) has been widely adopted. Derived from his study of the reporting practices across eight disciplines, the taxonomy is based on the analysis of RVs in 80 RAs from ten leading journals. As shown in Figure 1, reporting is realised by process functions and evaluative functions. The three process functions of reporting are research (real-world) acts, cognition acts, and discourse acts.

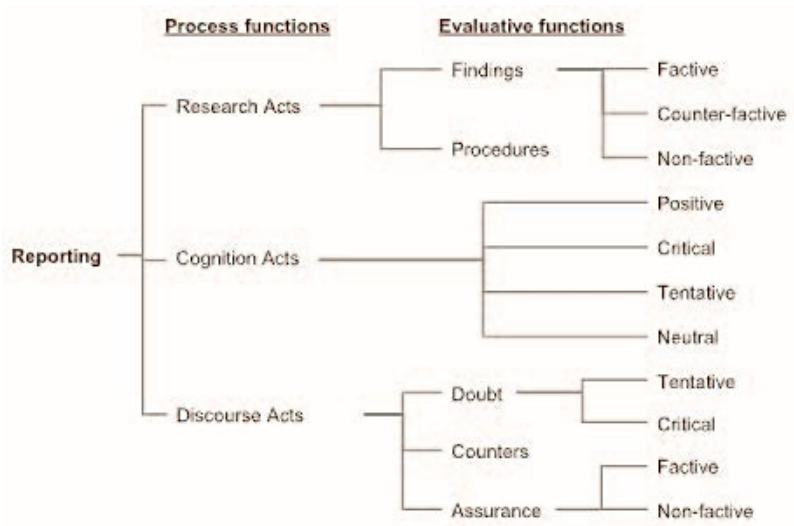


Figure 1: Categories of RVs (Hyland, 2002, p. 119)

First, research (real-world) acts are realised by verbs that represent experimental activities or actions performed. They

are used in statements of findings or procedures (Table 1).

Table 1: Research acts: Evaluative functions (adapted from Hyland, 2002, p. 119)

| **Findings: Factive verbs** | **Findings: Counter-factive verbs** | **Findings: Non-factive verbs** | **Procedures** |
|---|---|---|---|
| Writer acknowledges acceptance of author's results/conclusions. | Writer describes author's judgments as false or incorrect. | Writer does not express a clear attitudinal signal to the reliability of research findings. | Writer reports neutrally. |
| *demonstrate, establish, show, solve, confirm* | *fail, misunderstand, ignore, overlook* | *find, identify, observe, obtain* | *analysed, compared, replicated, investigated, studied* |

The second process function of RVs is cognition acts, with verbs expressing the cited author's mental process, serving positive, critical, tentative, or neutral evaluative functions (Table 2).

Table 2: Cognition acts: Evaluative functions (adapted from Hyland, 2002, p. 120)

| **Positive** | **Critical** | **Tentative** | **Neutral** |
|---|---|---|---|
| Writer represents author as having a positive attitude towards the proposition (reported matter), accepting it as true or correct. | Writer represents author as taking a critical stance towards the proposition. | Writer represents author as having a tentative view towards the proposition. | Writer represents author as holding a neutral attitude towards the proposition. |
| *agree, concur, hold, know, think, understand* | *disagree, dispute, not think* | *believe, doubt, speculate, suppose, suspect* | *picture, conceive, anticipate, reflect* |

The third process function of RVs is discourse acts, with verbs that focus on linguistic activities or the verbal expression of cognitive or research activities (Table 3).

Table 3: Discourse acts: Evaluative functions (adapted from Hyland, 2002, p. 120)

| **Doubt about reported claims** | **Doubt about reported claims** | **Counters** | **Assurance** | **Assurance** |
|---|---|---|---|---|
| Tentative | Critical | Writer attributing reservations about the correctness of the reported matter to author. | Factive: Writer acknowledges acceptance of author's results/conclusions. | Non-factive: Writer does not express a clear attitudinal signal to the reliability of research findings. |
| *postulate, hypothesise, indicate, suggest* | *evade, exaggerate, not account* | *deny, critique, question, warn* | *argue, explain, note, claim* | *state, describe, discuss, report* |

Research on RVs has examined different types of academic writing. In RAs, Yeganeh and Boghayeri (2015) compared the usage of four reporting verb groups (i.e., ARGUE, THINK, SHOW, and FIND) using the framework developed by Francis, Hunston, and Manning (1996) in papers in the field of second language acquisition written by native English and Persian writers. They found that English writers used more verbs from the ARGUE group, which corresponds to the discourse-act category in Hyland (2002). Persians used more verbs from the FIND group, which corresponds to the research-act category. In thesis writing, Charles (2006) also adapted the classification scheme by Francis et al. (1996) and examined the use of reporting clauses in doctoral theses. Comparing the disciplines of politics/international relations and materials science, Charles (2006) found that both disciplines use significant numbers of reporting clauses, with the most frequent verb group being ARGUE. Nguyen (2017), applying Hyland's (2002) taxonomy, studied the usage of RVs in 24 Vietnamese postgraduate students' TESOL master's theses. Findings showed that two-thirds of the RVs were discourse verbs, and less than one-tenth were cognition verbs. Regarding the evaluative functions of the RVs, more than one-third were non-factive verbs, slightly less than one-third were factive verbs, and approximately one-sixth

were tentative verbs. These findings thus all suggest that discourse act RVs, or verbs from the ARGUE group, are dominant in many kinds of academic writing.

Since some academic genres are sizeable in length with multiple parts, previous research has also examined the use of RVs in selected sections of, rather than the whole of, academic texts. Kwon, Staples, and Partridge (2018), for instance, investigated a group of first-year L2 writers' use of RVs in a literature-review assignment for a writing programme. They examined RVs from four semantic categories (Argue, Show, Find, Think) and the rhetorical functions of the RVs used in relation to such source types as textual source, self-source, and generalised source. Frequency analysis of RVs showed that the L2 student writers were quite capable of using RVs to refer to sources, using Argue verbs more frequently than the three other groups, with the textual reference function, which is roughly equivalent to the discourse-act process function in Hyland (2002), being the most dominant. Also focusing on the literature review section but from TESOL master's theses, Nguyen and Pramoolsook (2015) found discourse-act RVs to be the most prominent. Given that most previous studies have focused on the literature review section, where most citations and reporting verbs are used, it remains unclear whether the dominance of discourse-act RVs applies to other components of a thesis or an RA. Other research on L2 writers' use of RVs has shown a direct relation between language proficiency and the use of RVs. In an eight-year longitudinal case study, Kibler and Hardigree (2016) investigated the development of argumentative writing of a Spanish-English bilingual from high school through university. The type, function, and range of RVs were found to have a positive relationship with the growth in language proficiency and experience in writing. As such, these studies focusing on L2 writers' use of RVs in different types of academic writing suggest that novice and expert writers may differ in their patterns of use of RVs based on the specific rhetorical needs of the texts.

A different area of RV research is found in corpus linguistics. Bloch (2010), for example, conducted a concordance-based study comparing the use of RVs in formal research reports and

book reviews from the journal *Science* with that in student papers. Regarding the attitude towards the claim expressed, the most frequently found RVs in his data were mainly used with a positive evaluation. On the rare occasions when disagreement towards a cited author was expressed, learners used the RV *mention* more often than the journal article writers in order to avoid direct criticism. In another corpus study, Breeze (2017) examined the diachronic trend of evidential RVs in five corpora, namely the British National Corpus, Corpus of Contemporary American English, Corpus of Historical American English, Google Books, and Times Magazine Corpus, focusing on the most frequent four RVs in the passive form over a period of 200 years. The four verbs were the two 'Hearsay' verbs (discourse verbs) *say* and *report*, and the two 'Mindsay' verbs (cognition verbs) *suppose* and *expect*. Findings showed that the use of BE *said to*, which was mainly found in media and academic corpora, had been declining since the mid-twentieth century, and BE *reported to* was infrequently used in the period studied. While both BE *expected to* and BE *supposed to* usages had been increasing significantly, their semantic roles had developed in opposite directions over time, with the former construction shifting from deontic to evidential meanings and the latter from evidential to deontic. The study thus showed the changes in meaning and function of RVs over time.

While a substantial body of research has been conducted on RVs in different types of academic writing across disciplines, little is known about how RVs are used in the introductory section of RAs. As the first key component, the introduction plays a crucial role in setting the scene for the RA by means of three moves: establishing centrality, establishing a niche, and occupying the niche (Swales & Feak, 2004). However, the ways in which and the extent to which RVs are used across these moves in RA introductions remain under-researched. In this connection, the present study aims to address this unexplored area.

## 3. Methodology

This study compares three subfields in the sciences (radiology), social sciences (psychology), and humanities (linguistics) to

find out whether or not, and the extent to which, RVs are used differently for stance reporting. Since this study focuses on the introduction sections of empirical RAs, and the CARS model for introduction is employed, RAs with a clear introduction section were systematically sampled from these three disciplines based on the five-year Impact Factor (IF) of the journals as published in the Journal Citation Reports (JCR). For linguistics, 14 RAs with an identifiable introduction in the linguistics sub-corpus of the Corpus of Journal Articles 2014 (CJA2014)[1] were sampled. As the CJA2014 either has no or only a small number of RAs in radiology and psychology, the sub-corpora of these two disciplines were compiled. For each of the two disciplines, 64 RAs with an introduction were systematically sampled from eight journals with the highest five-year IF in 2016. This selection procedure ensures that the RAs collected have been the most influential in their respective field in a relatively comparable time period. In total, 142 RAs have been examined, with eight RAs from each of the eight top journals from radiology and psychology, and fourteen RAs from fourteen top linguistic journals. The Appendix shows the list of the 30 journals consulted.

The data analysis was carried out in five steps by a researcher who had undergone training in coding the RAs using the two models employed in the present study. First, a move analysis was conducted on each RA introduction, following the three-move structure of Swales and Feak (2004), namely, establishing centrality, establishing a niche, and occupying the niche. Table 4 summarises the size of the radiology, psychology, and linguistics RA introductions examined in this study in terms of the number of journal articles, total word count, and word counts for the three moves.

Table 4: Size of the radiology, psychology and linguistics RA introductions examined

| | **Radiology** | | **Psychology** | | **Linguistics** | |
|---|---|---|---|---|---|---|
| No. of articles | 64 | | 64 | | 14 | |
| Total word count | 23,667 | | 77,673 | | 7,807 | |
| Move 1 word count | 15,823 | (66.86%) | 48,377 | (62.28%) | 2,275 | (29.14%) |
| Move 2 word count | 4,720 | (19.94%) | 11,906 | (15.33%) | 2,733 | (35.01%) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Move 3 word count | 3,124 | (13.20%) | 17,390 | (22.39%) | 2,799 | (35.85%) |

For both radiology and psychology, proportionally, Move 1 (establishing centrality) contributes many more words than Move 2 (establishing a niche) and Move 3 (occupying the niche). For linguistics, by contrast, Move 1 contributes the smallest number of words, with Moves 2 and 3 almost equal in size. Further, in linguistics all three moves are relatively similar in size, unlike the dominance of Move 1 in radiology and psychology. Figure 2 exemplifies the analysis of the three moves in an RA introduction based on Swales and Feak (2004).

Second, each RA introduction was read to identify reporting sentences presented in either an integral format or a non-integral citation format, as well as their immediately preceding sentences. For an integral format, the name of the cited author is in the citing sentence; for a non-integral format, the cited author is either presented in parentheses or by superscript numbers, as defined by the convention of the journal. In the present study, it was found that psychology journals and linguistics journals used the APA in-text citation method, and radiology journals used superscript numbers. Third, RVs in the reporting sentences and those that preceded them were classified, adopting Hyland's (2002) taxonomy of RVs as described earlier. Fourth, each RV was studied in its linguistic context with its process and evaluative functions identified, according to the taxonomy of Hyland (2002). Fifth, all instances of RVs identified and the respective moves to which they belonged were input into a Microsoft Excel spreadsheet for the analysis of move-specific frequencies of occurrence and reporting functions.

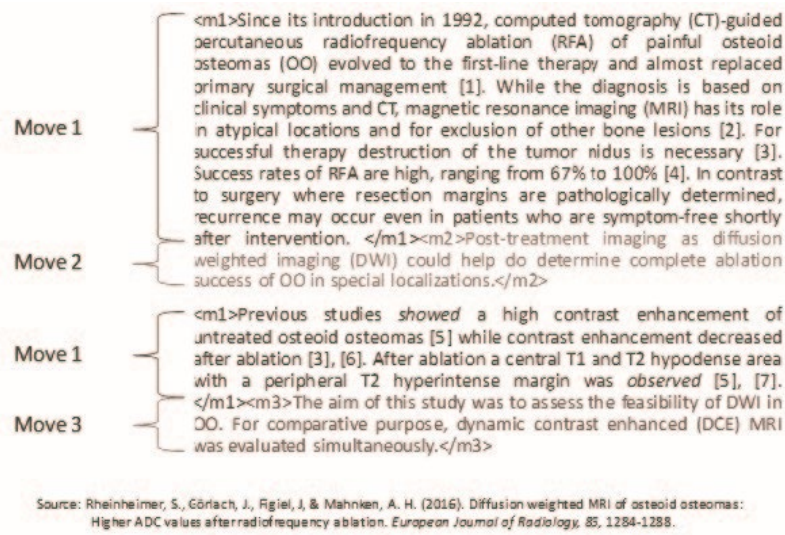


Figure 2: Example of the analysis of the three moves in an RA introduction based on Swales and Feak (2004). Source: Rheinheimer et al., 2016

# 4. Results and discussion

## 4.1 The use of RVs across moves and disciplines

Table 5 shows an overview of the frequencies and percentages of RVs in RA introductions across disciplines and moves.

Table 5: RVs in RA introductions across disciplines and moves

| **Number of RVs** | **Radiology** | **Psychology** | **Linguistics** |
|---|---|---|---|
| Total | 241 | 847 | 49 |
| (Per 1,000 words) | (10.18) | (10.90) | (6.28) |
| Move 1 | 183 | 676 | 21 |
| (Per 1,000 words) | (11.57) | (13.97) | (9.23) |
| Move 2 | 55 | 125 | 23 |
| (Per 1,000 words) | (11.65) | (10.50) | (8.42) |
| Move 3 | 3 | 46 | 5 |
| (Per 1,000 words) | (0.96) | (2.65) | (1.79) |

As shown in Table 5, linguistics has the lowest relative frequency of RVs per 1,000 words (6.28), whereas radiology (10.18) and psychology (10.90) have similar figures. This finding is contradictory to Hyland (2002), who found a greater use of RVs in soft disciplines including applied linguistics. He argued that soft disciplines "typically have less cohesive and established frameworks of knowledge" and "they possess less highly formalised and standardised codes for reporting research" (Hyland, 2002, p. 124). At the same time, subjects are "more diverse and less predictable and abstract" in these disciplines with an explicit recognition of human agency (Hyland, 2002, p. 124). This disciplinary difference, however, may be attributed to the fact that Hyland (2002) analysed RVs in all sections of an RA, whereas the present study focuses only on the introduction section. Given the relative brevity of an introduction section and its general purpose of setting the scene rather than providing the specifics of the research concerned, it is possible that the greater use of RVs in soft disciplines is found in the later sections, when issues such as subjects and human agency are dealt with in more detail.

Across the three disciplines, the relative frequencies of RVs used in Moves 1 and 2 are similar, whereas that in Move 3 is much lower. Therefore, for both the hard and soft disciplines examined in this study, RVs are found to be used much more frequently to establish centrality (Move 1) and to establish a niche (Move 2), but rarely to occupy the niche (Move 3). This is because the first two moves respectively highlight the importance of the field of study and argue for the need to fill an existing gap in previous research (others-focused), whereas the last move concentrates on the present research by outlining its contents such as purposes, findings, and structure (self-focused). As such, the expression of stance towards cited authors is more prominent in Moves 1 and 2.

### 4.2 Process functions of RVs

The RVs in different disciplines are categorised according to their process functions (Table 6).

Table 6: Process functions of RVs across the three disciplines (per 1,000 words)

| Process functions | Radiology | | Psychology | | Linguistics | |
|---|---|---|---|---|---|---|
| Research acts | 6.760 | | 6.308 | | 3.202 | |
| Cognition acts | 0.676 | | 1.519 | | 0.128 | |
| Discourse acts | 2.746 | | 3.077 | | 2.946 | |
| Total | 10.182 | | 10.904 | | 6.276 | |

Table 6 shows that all the three disciplines display similar patterns. Research acts are by far the most frequent, followed by discourse acts and cognition acts. Of the three process functions, cognition acts are the rarest in the data. This rarity of RVs fulfilling the cognition function is consistent with what has been found in previous research of academic writing. In master's theses, Nguyen (2017) found that only one-tenth of all the RVs refer to cognitive activities. In RAs, cognition act RVs only constitute 8% of the total (Hyland, 2002). In Hyland's (2002) study, however, 57% of the RVs serve the function of discourse acts, making it the most dominant function. By contrast, in this study, discourse acts are only the second most frequent process function, making up slightly more than one-third (35%) of the total. Given that discourse act RVs, or the corresponding ARGUE verb group, have been found to be the most frequent in many genres of academic writing (e.g., Charles, 2006; Hyland, 2002; Kwon, Staples, & Partridge, 2018), the high frequency of research-act RVs found in this study may suggest that stance reporting which centres on research activities is conducted more in the introduction section than in other sections of RAs. This is possibly because at the beginning of an RA, writers tend to provide background information on what previous research has examined generally, rather than focusing on specific claims or research findings which cited authors have presented.

Despite the similarities in the general pattern of frequency distribution of process function across the three disciplines, there exist some individual differences. Proportionally, linguistics has more RVs serving the process function of discourse acts. This can be seen in the close relative frequencies of RVs expressing research acts (3.202) and discourse acts (2.946). By contrast, the relative frequency of RVs in discourse acts is only less than half of that in research acts in the other two disciplines. This greater use of discourse-act RVs in linguistics is

consistent with Hyland's (2002) finding that this verb type is more common in the social sciences than in the natural sciences. It also resonates with results from previous studies done specifically in the sub-fields of linguistics concerning the dominance of verbs from the ARGUE group (e.g., Nguyen, 2017; Yeganeh & Boghayeri, 2015). In psychology, there is a greater overall use of RVs in cognition acts (1.519), with its relative frequency being about half and a quarter of that in discourse acts (3.077) and research acts (6.308) respectively. As such, cognition acts are much higher in proportion in psychology compared with the other two disciplines. Interestingly, these patterns of use of RVs in linguistics and psychology seem to suggest that writers in different disciplines may have preferences for process functions associated with their own discipline-specific research activities. Writers in linguistics therefore use more reporting verbs which focus on language or discourse, while writers in psychology tend to use more reporting verbs which focus on the mind.

### 4.3 RVs common to the three disciplines

Shifting the attention from overall patterns to individual RVs, this section examines the forms of RVs which are shared among the three disciplines. Of the 144 unique RVs identified in the data, 17 are common to radiology, psychology and linguistics. Table 7 shows the 17 common RVs serving process and evaluative functions.

Table 7: RVs serving process and evaluative functions common to the three disciplines

| RV | Process function: evaluative function |
|---|---|
| *address* | Research: procedures |
| *compare* | Research: procedures |
| *conclude* | Discourse: assurance (non-factive) |
| *conduct* | Research: procedures |
| *demonstrate* | Research: findings (factive) |
| *describe* | Discourse: assurance (non-factive) |
| *explore* | Research: findings (non-factive) |
| *find* | Research: findings (non-factive) |
| *focus* | Cognition: neutral |
| *indicate* | Discourse: doubt (tentative) |

| | |
|---|---|
| | Discourse: assurance (non-factive)<br>Discourse: assurance (factive) |
| *investigate* | Research: procedures |
| *propose* | Discourse: doubt (tentative) |
| *provide* | Discourse: assurance (factive) |
| *report* | Discourse: assurance (non-factive) |
| *show* | Research: findings (factive) |
| *suggest* | Discourse: doubt (tentative) |
| *use* | Research: procedures |

Frequency analysis of these 17 RVs shows that *explore* (research: findings), *find* (research: findings), *show* (research: findings), and *suggest* (discourse: doubt) are the four most frequently used RVs across the three disciplines. This echoes Hyland's (2002) finding that the most frequently occurring discourse act RV is *suggest* and the most frequent research act RVs are *find* and *show*. Importantly, the study also reveals *explore* as a highly frequent research act RV in RA introductions in the three disciplines examined.

Among the seventeen RVs in Table 7, nine are in the category of research acts (*address*, *compare*, *conduct*, *demonstrate*, *explore*, *find*, *investigate*, *show*, *use*), seven in discourse acts (*conclude*, *describe*, *indicate*, *propose*, *provide*, *report*, *suggest*), and only one (*focus*) in cognition acts. These findings suggest that not only are research acts by far the most frequent process function served in the data as discussed earlier, but this function is also realised by more forms of RVs than other process functions. The two evaluative functions of findings and procedures are also fairly well represented by the nine shared research act RVs. There is, however, no counter-factive RV serving the evaluative function of findings across the three disciplines. Similarly, the seven shared discourse act RVs fulfil the evaluative functions of doubt and assurance but not of counters. There is also no shared RV belonging to the critical sub-category of doubt for the evaluative function of discourse acts. In other words, none of the RVs in Table 7 expresses the author's judgments as false or incorrect, casts doubt about reported claims critically, or attributes reservations about the correctness of the reported matter to the author. These missing types of research-act and discourse-act RVs from the shared list

indicate that writers in the three disciplines tend to avoid criticism in reporting stance with the use of RVs in the introductions. This avoidance of negative evaluation is also supported by the presence of the only shared cognition-act RV 'focus' on the list, which belongs to the neutral category. In the introductory section of an RA which constitutes its first key component, presenting counter-factive or negative evaluation may give the reader a subjective impression when no further explanation or support of the research findings is given. Writers may therefore use tentative evaluation instead of critical devices in the introductions to protect themselves from unwarranted refutation. Given the face threat associated with such academic criticisms which may have grave consequences for the writer's future publication and even career prospects (cf. Hyland, 2002), it is not surprising that such unfavourable assessment of another's research through RVs remains rare in academic texts in general across disciplines but not only in RA introductions (Bloch, 2010).

One shared RV which deserves special attention is *indicate*. As a discourse act RV, it fulfils three evaluative functions in the data examined, namely, doubt (tentative), assurance (non-factive), and assurance (factive). In Hyland's (2002) study, however, *indicate* only serves one evaluative function – doubt (tentative). These three evaluative functions of *indicate*, which show how the same RV may express different and at times opposite stances depending on the context, are illustrated as follows.

Extract (1). *indicate*: discourse: doubt (tentative)

… is associated with low math achievement no matter the underlying numerosity skill, a recent study indicates that there may be a link between math anxiety and numerosity (Maloney, Ansari, & Fugelsang, 2011).

Hart et al., 2016.

In Extract (1), *indicates* as a discourse act RV is followed by a hedged clause *that there may be a link*, suggesting that what follows is possible but not definite. It hence serves the evaluative function of doubt (tentative).

Extract (2). *indicate*: discourse: assurance (factive)

There is ample evidence indicating that anxiety and depression are associated with the tendency to selectively attend to negative or threatening information: an 'attentional bias' (for meta-analyses see

Bar-Haim et al., 2007; Peckham et al., 2010).

Voogd et al. 2016.

In Extract (2), the word *evidence*, pre-modified by the adjective *ample*, shows that the writer acknowledges acceptance of the author's results or conclusions.

Extract (3). *indicate*: discourse: assurance (non-factive)

Behavioral genetic studies of twins also indicate that math achievement is familial (Alarcon, DeFries, Light, & Pennington, 1997; Hart, Petrill, Thompson, & Plomin, 2009; Oliver et al., 2004; Thompson, Detterman, & Plomin, 1991), and that math anxiety is influenced by both familial and child-specific environment effects (Wang et al., 2014).

Hart et al., 2016.

In Extract (3), when using *indicate*, the writer does not express a clear attitudinal signal to the reliability of the research findings cited, possibly because a number of non-integral citations have been included in the parentheses afterwards.

### 4.4 Discipline-specific RVs

Moving away from the shared RVs to discipline-specific RVs, this section examines RVs found only in one of the three disciplines in the data examined. The number of discipline-specific RVs in psychology, radiology, and linguistics is respectively 69, 18, and 5. In other words, psychology contains the highest number of discipline-specific RVs, which is approximately four times that in radiology and almost fourteen times that in linguistics. Table 8 lists these discipline-specific RVs in each discipline according to their process and evaluative functions.

Table 8: Process and evaluative functions of discipline-specific RVs

| | **Radiology (N = 18)** | **Psychology (N = 69)** | **Linguistics (N = 5)** |
|---|---|---|---|
| **Research-act RVs** | | | |
| Findings: factive | *discover, offer* | *complete, detect, implement, tie, underscore* | |
| Findings: counter-factive | *lack, suffer* | | |
| Findings: non-factive | | *result* | |

| | | | |
|---|---|---|---|
| Procedures | *acquire, adopt, analyse, diagnose, engineer, publish, render, validate, verify* | *adjust, administer, ask, assess, base, capture, classify, consist, define, design, direct, distinguish, evolve, follow, include, instruct, manipulate, map, originate, randomise, rely, replicate, require, restrict, revise, specify, target, teach, treat* | *operationalise* |
| **Cognition-act RVs** | | | |
| Positive | *judge* | *aim, attribute, contend, devise, implicate, initiate, reason, see* | |
| Critical | | *neglect, underestimate* | |
| Tentative | | *appear, assume, predict, hypothesise, tend* | |
| Neutral | | *link, posit, interpret, pay, view* | |
| **Discourse-act RVs** | | | |
| Doubt: tentative | | | *claim* |
| Doubt: critical | | *criticise* | |
| Counters | | *leave* | *not describe* |
| Assurance: factive | *introduce, revive* | *argue, determine, point, support, emphasise, highlight, illustrate, speak* | *articulate, pioneer* |
| Assurance: non-factive | *mention, refer* | *explain, mediate, represent, state* | |

Table 8 shows that across the three disciplines, both radiology and psychology have the largest number of discipline-specific RVs in the category of research acts. Specifically, most of these discipline-specific research act RVs are found in the sub-category of procedures. This confirms the finding earlier regarding the dominance of research-act RVs across all the three disciplines in the discussion of the shared RVs (Section 4.3). At the same time, it also highlights the importance of referring to the procedural aspects of research especially in radiology and psychology, with a wide range of verbs serving this function. This is consistent with Hyland's (2002, p. 119) observation that this sub-category of RVs displayed "the greatest variety of expression" in his data across eight

disciplines. In linguistics, by contrast, the discipline-specific RVs are mostly found in the discourse-act category, again resonating with the argument made earlier regarding the overall patterns of the process functions of RVs (Section 4.2) that linguists tend to be more language or discourse oriented. The disciplinary differences observed here are also in line with Hyland's (1999) observation that the social sciences and humanities have a preference for discourse-act RVs, whereas the sciences and engineering prefer RVs that refer to research and real-world actions.

### 4.5 Process functions of RVs across moves

Apart from being discipline specific, RVs are also move specific to a certain extent, as discussed in Section 4.1. Table 9 shows the process functions of RVs across moves in the three disciplines.

Table 9: Process functions of RVs across moves in the three disciplines (per 1,000 words)

| Discipline | Move | Research acts | Cognition acts | Discourse acts | Move/discipline combined | |
|---|---|---|---|---|---|---|
| Radiology | Move 1 | 7.773 | 0.885 | 2.907 | 11.565 | |
| | Move 2 | 7.627 | 0.212 | 3.814 | 11.653 | |
| | Move 3 | 0.320 | 0.320 | 0.320 | 0.960 | |
| Psychology | Move 1 | 8.062 | 1.922 | 3.989 | 13.974 | |
| | Move 2 | 6.719 | 1.344 | 2.436 | 10.499 | |
| | Move 3 | 1.150 | 0.518 | 0.978 | 2.645 | |
| Linguistics | Move 1 | 4.835 | 0.440 | 3.956 | 9.231 | |
| | Move 2 | 5.123 | 0.000 | 3.293 | 8.416 | |
| | Move 3 | 0.000 | 0.000 | 1.786 | 1.786 | |

As explained earlier, for all the disciplines examined, most of the RVs appear in Moves 1 and 2 in the introduction section. Move 3, in comparison, contains substantially fewer RVs. Specifically, in both Moves 1 and 2, research-act RVs dominate. This is particularly the case for radiology and psychology, and to a lesser extent for linguistics, as there is a noticeably greater use of discourse-act RVs in Moves 1 and 2 in the latter discipline compared with the former two. In Move 3, there is a more even spread of the three types of RVs. In radiology, RVs serving the three process functions are equally frequent. In psychology,

discourse-act RVs are almost just as commonly found as research acts. In linguistics, only discourse-act RVs are used. Taken together, these findings suggest that Move 3 exhibits quite different patterns from Moves 1 and 2 in terms of the frequency of use and the process function of RVs. In the introduction section of an RA, occupying a niche requires fewer RVs, which often refer to not only research but also cognition and discourse activities. This is possibly because this last move provides more opportunities for elaboration and interpretation involving mental and verbal acts after the research acts introduced in the first two moves. Establishing centrality and establishing a niche, by contrast, see a much greater use of RVs which focus on research activities, as these two moves involve emphasising what research has been done in the past.

### 4.6 Evaluative functions of RVs across moves

To further understand the similarities and differences between moves in the use of RVs, the evaluative functions of RVs, in addition to their process functions as presented earlier, have also been analysed. Table 10 shows the evaluative functions of RVs across moves in the three disciplines.

Table 10: Evaluative functions of RVs across moves in the three disciplines (per 1,000 words)

| | | **Radiology** | | | **Psychology** | | | **Linguistics** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | M1 | M2 | M3 | M1 | M2 | M3 | M1 | M2 | M3 |
| **Research acts** | | | | | | | | | | |
| Findings | Factive | 2.591 | 2.542 | 0.320 | 2.253 | 1.932 | 0.575 | 1.319 | 1.098 | - |
| | Counter-factive | 0.063 | 0.424 | - | 0.062 | 0.084 | - | - | - | - |
| | Non-factive | 1.327 | 0.847 | - | 2.088 | 1.428 | 0.288 | 1.319 | 0.366 | - |
| Procedures | | 3.792 | 3.814 | - | 3.659 | 3.276 | 0.288 | 2.198 | 3.659 | - |
| **Cognition acts** | | | | | | | | | | |
| Positive | | 0.379 | - | 0.320 | 0.620 | 0.252 | 0.230 | - | - | - |
| Critical | | 0.063 | - | - | 0.083 | 0.168 | 0.115 | 0.440 | - | - |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Tentative | | - | 0.212 | - | 0.455 | 0.168 | - | - | - | - |
| Neutral | | 0.442 | - | - | 0.765 | 0.756 | 0.173 | - | - | - |
| **Discourse acts** | | | | | | | | | | |
| Doubt | Tentative | 0.885 | 0.636 | 0.320 | 2.026 | 1.596 | 0.403 | 0.879 | 0.366 | 1.429 |
| | Critical | - | - | - | 0.021 | - | 0.058 | - | - | - |
| Counters | | - | - | - | - | 0.084 | - | 0.440 | - | - |
| Assurance | Factive | 0.379 | 0.212 | - | 0.972 | 0.336 | 0.403 | 1.319 | 1.464 | - |
| | Non-factive | 1.643 | 2.966 | - | 0.972 | 0.420 | 0.115 | 1.319 | 1.464 | 0.357 |

Comparison across the three disciplines shows that psychology sees the most even distribution of RVs across moves and across evaluative functions. RVs serving all evaluative functions are found in almost all the moves in this discipline. By contrast, radiology records no use of two sub-types of discourse act RVs, namely doubt (critical) and counters, while three out of the four sub-types of cognition acts are only found in one out of the three moves. For linguistics, many of the evaluative functions of RVs are missing, namely the absence of the research-act RVs for findings (counter-factive), the discourse-act RVs for doubt (critical), and three out of the four cognitive-act RVs – positive, tentative, and neutral.

These missing evaluative functions across moves in the three disciplines again confirm observations made earlier that negative evaluation is uncommon and that cognition acts are rare in the introduction section, especially in radiology and linguistics. Further, these findings are also in line with results from Nyugen and Pramoolsook (2015), who found the avoidance of negatively evaluated claims and the low use of cognition-act RVs in the literature review of master's theses. The stronger preference for cognition acts in psychology observed here across moves is also consistent with the earlier finding that psychology has the greatest number of discipline-specific cognition-act RVs. These seem to suggest a link between the subject matter of the discipline and the function of the RVs

used.

Comparison across the three moves indicates that Move 1 has the richest range of evaluative functions of RVs, while Move 3 only displays very limited functions in radiology and linguistics but not so in psychology. Of all the evaluative functions of RVs, the discourse act of expressing doubt tentatively about reported claims is found across all move types. The discourse act of assurance (factive and non-factive), as well as most research acts except findings (counter-factive), is also fairly well represented across moves. The research act of procedures, in particular, is the most dominant function of all across disciplines, with its relative frequency being much higher than those of other evaluative functions. These common evaluative functions suggest that writers tend to use RVs to focus on research activities, especially the procedural aspects, and to hedge their reservation about cited research in the introduction section.

By contrast, Nyugen and Pramoolsook (2015) found that in the literature review chapter of TESOL theses, the discourse act of assurance is the most dominant evaluative function of RVs, making up more than half (53.42%) of the total use. This highlights the difference in the rhetorical function of these two sections. As the opening section, the introduction establishes the territory by outlining what has been done, and thus focuses more on reporting neutrally and generally on research activities conducted in the field. Often as one of the lengthiest sections, the literature review, by contrast, provides details of what has been done, the primary purpose of which is to support one's own claims. The discursive reference to specific results from previous research as concrete evidence of the writer's argument is therefore necessary.

## 5. Conclusion

In this article, we have reported the use of RVs in the introduction section of RAs in the three disciplines of radiology, psychology, and linguistics. Our analysis has shown that, while there are disciplinary differences in the relative frequency of RVs and the functional preference of RVs, there are also similarities in terms of the dominant process and evaluative

functions of RVs across disciplines in the introductions. Importantly, focusing on the introduction section of RAs allows us to reveal section-specific features which are not identifiable in previous research examining RAs in full. Through a detailed analysis of the functions of RVs across moves in the introduction section, we have shown that not all of the three moves make equal use of RVs, and that not all of the process and evaluative functions of RVs are equally well represented in the moves.

Admittedly, only three disciplines have been examined in the study. It is also arguable to what extent the three disciplines cover the broad spectrum of areas of academic knowledge from the hard end to the soft. The relatively small number of RAs studied, especially in linguistics, might have disguised intra-disciplinary variation. Other components of RAs, especially those with heavy use of RVs, including the literature review and the discussion section, have not been investigated or contrasted in this study owing to limited space. Since only one coder was involved in the coding process, it was not possible to establish intercoder reliability.

Nonetheless, by using the introduction section as the starting point, we hope this study has created a space to illustrate how RVs help to set the scene at the onset of an empirical research report for the function of stance reporting and for the construction of the discourse structure. Despite the relatively small data size, the normalisation of frequency has still provided a fair comparison of the patterns of usage of RVs in the three disciplines.

The study has made useful theoretical and methodological implications for future research on how RVs are linguistically and functionally realised in RAs for stance reporting in a specific discipline, as well as comparative research on RVs in different RA sections and in different disciplines. Further studies can extend the scope of research to a larger number of disciplines with a larger number of RAs, and focus on other sections of RAs. This will in turn allow us to have a more systematic and thorough comparison of the use of RVs across this academic genre and further our understanding of where and how stance reporting is principally achieved in RAs, ultimately contributing towards more effective academic writing.

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## Notes

1. The 6.3 million-word Corpus of Journal Articles 2014 (CJA2014), compiled by the Research Centre for Professional Communication in English (RCPCE), The Hong Kong Polytechnic University, contains 760 research articles from 720 five-year high Impact Factor or highest SJR indicator journals of the year 2014 in 38 disciplines. It is available online at the RCPCE Profession-specific Corpora website (http://rcpce.engl.polyu.edu.hk/). The journal articles in the CJA2014 linguistics sub-corpus were systematically sampled from the 20 highest JCR five-year Impact Factor journals of 2014, all of which are empirical research articles.

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## Appendix: list of journals

| Psychology | | ISSN# |
|---|---|---|
| 1. | *Behaviour Research and Therapy* | 0005-7967 |
| 2. | *Development and Psychopathology* | 0954-5794 |
| 3. | *Emotion* | 1528-3542 |
| 4. | *Health Psychology* | 0278-6133 |
| 5. | *Journal of Consulting and Clinical Psychology* | 0022-006X |
| 6. | *Journal of Counseling Psychology* | 0022-0167 |
| 7. | *Journal of Educational Psychology* | 0022-0663 |
| 8. | *Journal of Experimental Psychology – General* | 0096-3445 |
| | | |
| Radiology | | |
| 1. | *American Journal of Roentgenology* | 0361-803X |
| 2. | *Clinical Nuclear Medicine* | 0363-9762 |
| 3. | *European Journal of Nuclear Medicine and Molecular Imaging* | 1619-7070 |
| 4. | *European Journal of Radiology* | 0720-048X |
| 5. | *European Radiology* | 0938-7994 |
| 6. | *Journal of Magnetic Resonance Imaging* | 1053-1807 |
| 7. | *Molecular Imaging and Biology* | 1536-1632 |
| 8 | *Radiology* | 0033-8419 |
| | | |
| Linguistics | | |
| 1. | *American Journal of Speech-Language Pathology* | 1058-0360 |
| 2. | *Applied Linguistics* | 0142-6001 |
| 3. | *Applied Psycholinguistics* | 0142-7164 |
| 4. | *English for Specific Purposes* | 0889-4906 |
| 5. | *Journal of Child Language* | 0305-0009 |
| 6. | *Journal of Communication Disorders* | 0021-9924 |
| 7. | *Journal of Fluency Disorders* | 0094-730X |
| 8. | *Journal of Second Language Writing* | 1060-3743 |
| 9. | *Language* | 0097-8507 |
| 10. | *Language Learning* | 0023-8333 |
| 11. | *Language Learning and Technology* | 1094-3501 |
| 12. | *Language, Speech, and Hearing Services in Schools* | 0161-1461 |
| 13. | *Research on Language and Social interaction* | 0835-1813 |
| 14. | *Studies in Second Language Acquisition* | 0272-2631 |