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LEXICAL VERBS OF EPISTEMIC MODALITY IN ACADEMIC WRITTEN ENGLISH: DISCIPLINARY VARIATION

The article examines the disciplinary preferences of medical and psychology writers of research articles (RAs) in the use of epistemic lexical verbs (ELVs), regarding their frequency, prominence, distribution across the RA sections, and recurrent phraseology. The results show that disciplinary affiliation affects these phenomena, as more ELVs are found in psychology than in medicine. Both groups prefer speculative judgements and quotative evidence and most frequently use ELVs in Discussions. Yet, psychology authors are more balanced in their preferences and rely on a wider selection of frequent ELVs which are often combined with self-mention. Medical authors are more inclined towards deductive ELVs. Disciplinary differences are also observed in the choice of the specific ELVs, their frequency distributions and phraseology in the distinct RA sections.

Keywords: academic writing, research article, disciplinary variation, epistemic lexical verbs

1. Introduction

Academic discourse has been traditionally perceived as relatively devoid of explicit authorial intrusions. Yet, scholarly interaction involves the negotiation of knowledge claims, the scientific significance of which needs to be evaluated for the disciplinary audience to acknowledge their novelty, relevance and validity. Creating such a dialogic space where even differing views can be accepted as shared typically involves the proper positioning of oneself and their work through coherent discourse that is seen as credible once the authors' commitment to the expressed views transpires in their texts. Therefore, recent studies of

academic discourse have been debating about different manifestations of authorial intervention in research genres (e.g. Lehman 2018), one of them being epistemic modality, which is concerned with the "modes of knowing" in terms of the speaker's opinion or belief about the truth of the proposition (Nuyts 2001: 28). Typically, however, the focus of such investigations is on a varied selection of epistemic modality markers, that is, a researcher simultaneously analyzes a selection of epistemic nouns (e.g. *fact*), adjectives (e.g. *evident*), adverbs (e.g. *possibly*) as well as modal (e.g. *may*) and lexical verbs (e.g. *seek*).

By contrast, the present study explores the use of one specific device of epistemic modality, namely, epistemic lexical verbs (ELVs), which are important rhetorical devices used "for speakers' intervention both to convey judgement, certainty and commitment to the truth of the propositions and also to interact with audiences" (León 2006: 210). Previous studies have shown that epistemic meanings conveyed through lexical verbs are dependent on the author's cultural affiliation (e.g. Dontcheva-Navratilova 2018) and the language in which they write (e.g. Pérez-Llantada 2010). The writers' disciplinary discourse conventions have also been evidenced as impacting on the expression of modality through ELVs, as shown by Dontcheva-Navratilova (2018) for linguistics and economics.

Indeed, in each discipline specialized knowledge is created by means of a different constellation of lexical, grammatical, and rhetorical devices (Hyland 2017: 9), but the question remains about the extent to which this holds true for such seemingly related disciplines as medicine and psychology, which have been selected for the present analysis. These two fields share the object of study, namely humans, and potentially their insiders may have developed similar ways of referring to what they write about, especially that the social sciences (i.e. psychology) "have partly adopted methods of the sciences" (i.e. medicine) (Hyland 2009: 63). However, the hard disciplines are rigorous, experimental and quantitative in approach, but explanatory, objective, marked by accuracy, reliance on solid data and cumulativeness of knowledge; whereas the social sciences are softer, that is, more stylistically elegant, discursive, qualitative and introspective in approach, but quite fuzzy, interpretative, marked by lower reliability, validity and rigour (Hyland 2006, 2009). These differing characteristics may thus affect the expression of authorial commitment to knowledge construction in the two disciplines.

This study attempts to reveal the disciplinary preferences of medical and psychology authors writing in English for employing ELVs with respect to their: frequency, prominence, distribution across research article (RA) sections, and recurrent phraseology. The aim is twofold: to determine to what extent disciplinary affiliation affects the choice and use of ELVs, and to highlight the tendencies that are characteristic of this aspect of rhetorical variation in academic prose, attempting to foster disciplinary awareness among academics and support novice scholars in improving professional academic writing skills.

2. Epistemic modality and lexical verbs

Epistemic modality expresses the speaker's evaluation of the truth of a proposition, and thus pertains to aspects of belief or knowledge that serve speakers as a basis for their judgements about actions, events or states of affairs (Hoye 1997: 42). It is marked by persuasiveness, as it is concerned with altering the utterance so that it expresses probability, truthfulness and confidence (Vukovic 2014: 38). In academic discourse, where new knowledge claims are tested against potential criticism from the readers, authors need to thoughtfully qualify the degree of their (in)certitude concerning the truth of their propositions. The aim is to convince those reading a scholarly article that what is argued in it constitutes a valuable contribution to scientific research. The levels of commitment that scholars bring to their texts reveal not only their status of knowledge and attitudes to the truth of their statements, but also their interpersonal relationship with the readers. As Halliday (1970: 143) argues, modality derives from the interpersonal function of language, which "serves to establish and maintain social relations: for the expression of social roles, […] and also for getting things done, by means of the interaction between one person and another".

An important feature of epistemic modality is its scalar nature which enables writers to modulate the degree of commitment to their claims. Nuyts (2016: 38) explains that "epistemic modality may be considered a matter of degree, i.e., as involving a scale, at least going from absolute certainty via probability to fairly neutral possibility that the state of affairs is real". Those scalar interpretations of modal meanings encompass three (e.g. Hoye 1997) to even five different values (e.g. Badran 2002), though there are also approaches assuming that epistemic modality serves either to hedge or boost propositions (e.g. Hyland 1998b). Different shades of epistemic qualifications help to "mark certainty (or doubt), actuality, precision, or limitation; or […] indicate the source of knowledge or the perspective from which the information is given" (Biber et al. 1999: 972). They can be realized either grammatically, for instance, though verbs: modal (e.g. *may*) and lexical (e.g. *show*) or the grammatical mood (e.g. *She may have started*); or lexically, for example, through adverbials (e.g. *perhaps*) or modal tags (e.g. *John is coming on Friday, I think*).

Palmer (1986) claims that epistemic modality comprises evidentials and judgements of necessity and possibility. In his subsequent work, Palmer (2001) subsumes epistemic modality, alongside evidential modality, under the category of propositional modality. Both epistemic modality and evidentiality express the "speaker's attitude to the truth-value or factual status of the proposition", however, the former conveys "judgments about the factual status of the proposition" and the latter encodes the basis for expressing the proposition and

evaluates its validity (Palmer 2001: 24). According to Warchał (2015: 72), Palmer's division translates into "two subsystems of epistemic modality: judgments, which involve the speaker's assessment of the degree of possibility that the situation expressed by the proposition holds […] and evidentials, which make reference to the type of evidence the speaker has to support the claim".

It should be noted, however, that the relationship between evidentiality and epistemic modality is not entirely transparent, especially that from the conceptual point of view, there is a difference between specifying, respectively, the source of information and the speaker's evaluation of how reliable that information is (Dendale and Tasmowski 2001: 341). González et al. (2017) explain the relationship between the two categories as follows.The advocates of a total inclusion (e.g. Palmer, 1986) claim that speakers tend to make judgements and show various degrees of commitment to what they say by indicating the evidence which supports the propositional content of utterances. The proponents of a disjunction relation (e.g. Aikhenvald, 2004) argue that the very fact of asserting the source of knowledge does not necessarily imply that the speaker is evaluating the truth of the uttered proposition. The final approach to the matter is that of overlap, where evidentiality and epistemic modality are seen as interrelated but treated separately. Hence, scholars (e.g. Nuyts 2001) suggest that the two categories overlap in some respects, since an interplay of their exponents is typically used to assess the validity of the expressed claims, making them more believable and thus acceptable to other people.

The present study follows Palmer's (1986) view that evidentiality falls within the scope of epistemic modality. Hence, the categories of judgements and evidentials serve as a basis for the present taxonomy of ELVs, which was later developed by Hyland (1998: 119-129). Judgement ELVs reveal the writers' position on their claims, and include speculative and deductive verbs, where the former indicate uncertainty about the factual status of these claims (e.g. *suggest*) and the latter present the claims as based on inferential reasoning (e.g. *deduce*). Evidential ELVs indicate the writers' assessment of the reliability of the information based on its evidential source, and include quotative and sensory verbs, where the former indicate external sources (e.g. *report*) and the latter mark sensory evidence (e.g. *seem*), as well as rationalizing narrators that match evidence to goals (e.g. *seek*). In comparison with other epistemic modality devices, ELVs offer an the writer an explicit way of indicating their commitment to a proposition (Hyland and Milton 1997: 190), especially that they "mark both, the mode of knowing and its source (belief, deduction, report, perception), and thereby carry implications about the reliability of the knowledge itself" (Hyland 1998: 120). Some ELVs serve multiple functions, thus their contextual meaning has to be carefully determined, as illustrated by *suggest*, which conveys a speculative judgement in *we suggest that*, but indicates quotative evidence in *Jones (1993) suggests that*.

3. Material and method

The analysis was carried out on a corpus of 60 RAs in medicine (MED) and psychology (PSY). Each discipline-specific subcorpus comprises 30 articles published in high impact international journals in the years 2018–2019 and was compiled along the same criteria: five journals per discipline, six articles per journal, three per year. The articles were written by Anglophone scholars,[1] as confirmed by their nationality and affiliation with an English-speaking institution (mostly British or American). Before inclusion in the corpus, the texts were cleaned by removing abstracts, notes, block and longer in-text quotations, linguistic examples, bibliographies, tables, figures, and subsequently converted to plain-text format.

Table 1. Corpus composition

Subcorpus	Words[2]	Journals
Medicine (30 RAs)	90,679	*Cancer Treatment and Research Communications* *Infection, Disease & Health*, *The Lancet Haematology* *International Journal of Surgery Open*, *Journal of Orthopaedics*
Psychology (30 RAs)	192,183	*Acta Psychologica*, *Additive Behaviors Report* *Child Abuse & Neglect*, *Psychology of Sport and Exercise* *Journal of Applied Developmental Psychology*
60 RAs	282,862	

The articles were coded into four rhetorical sections required for the study (i.e. Introduction, Methods, Results and Discussion). Most of the RAs followed this organizational pattern and the distinct sections were marked by explicit headings. Yet, sometimes the Discussion section additionally performed the rhetorical functions typically associated with the Conclusion (i.e. summarizing and evaluating the study, drawing deductions from the research), and then, the latter was not clearly labeled as a separate part of the paper. To neutralize the effect this could have on the comparability of results across the subcorpora, in those few cases when the Conclusion constituted a separate section,

[1] All of the authors were affiliated with an English-speaking institution.

[2] The large discrepancy between the two collections of texts might be partly due to the word limits imposed by the respective journals. In the medical journals considered in the study, the acceptable word range for research articles was 2500-4500 words, whereas in the psychology journals, the limit was either not specified or it was set at 45 pages (except for *Additive Behaviors Report* – 3500 words, and *Psychology of Sport and Exercise* –15 pages).

it was considered as an integral part of the Discussion section and coded under the same label.

Subsequently, based on the relevant literature (Hyland 1998a; Pérez-Llantada 2010; Dontcheva-Navratilova 2018), a list of 42 ELVs was compiled,[3] which were then searched for in the entire corpus, using the Concord function of WordSmith (Scott 2012). After applying this procedure, four items were excluded due to non-occurrence (*deduce*, *maintain*, *speculate*, *suppose*) and 12, due to low frequency (i.e. <10; *admit*, speculative *argue*, quotative *believe*, *claim*, *doubt*, *exhibit*, *imply*, *infer*, *presume*, *quote*, *reason*, *suspect*). The remaining 26 ELVs, with the frequency of 10 each, were chosen for the final list and subcategorized along the judgement-evidence divide into five types proposed by Hyland (1998a) (see Table 2).

Table 2. ELVs subjected to analysis

Type of ELV	Subtype of ELV (No)	ELVs
Judgement	Speculative (9)	*assume*, *believe*, *consider*, *expect*, *indicate*, *know*, *predict*, *propose*, *suggest*
	Deductive (4)	*calculate*, *conclude*, *demonstrate*, *estimate*
Evidential	Quotative (7)	*argue*, *indicate*, *note*, *propose*, *report*, *show*, *suggest*
	Sensory (4)	*appear*, *notice*, *observe*, *seem*, *view*
	Narrators (2)	*attempt*, *seek*

The chosen ELVs were checked manually to determine their epistemic meaning and analyzed with respect to their frequency, prominence, distribution and phraseology in the IMRD sections of the two disciplines. This part of the analysis was supported by concordance and collocate tools. To enable comparison of the findings across the subcorpora and with previously reported data, raw frequencies were normalized per 10,000 words, which is "the convention […] for smaller corpora" (Brown 2012). Disciplinary differences in (raw) frequencies were tested with the Chi-square test (significant at $p<0.05$).

4.1. Frequency of ELVs

2770 ELVs were identified in the corpus. Table 3 shows that psychology authors used ELVs significantly more frequently than medical authors ($p<.0001$), which correlates with Vázquez and Giner's (2008) finding that soft disciplines

[3] Conversational verbs like *think* were excluded, as they are rare in the written data (Hyland, 1996: 264).

rely more on epistemic modality than hard disciplines do. This might be due to the discursive character of the former disciplines that are less attached to rigorous research and allow room for questions, interpretations and a more eloquent style of writing. Indeed, "the nature of the research findings" in psychology does not always "allow the author to make strong claims or draw clear conclusions" and then ELVs, particularly those serving as hedges, "give an accurate picture of the level of certainty" (Vold 2006a: 81), assisting scholars in their pursuit of precision rather than modesty or politeness.

Table 3. Frequency of ELV types in the subcorpora

Subcorpus	**Medicine**		**Psychology**		**Statistics**		
Type of ELV	**no**	**n/10,000**	**no**	**n/10,000**	$\chi^2(1)$	**P-value**	**Cramer's *V***
Judgement	389	42.9	1099	57.2	23.79	<.0001	.009
Speculative	*246*	*27.1*	*901*	*46.9*	59.09	<.0001	.014
Deductive	*143*	*15.8*	*198*	*10.3*	15.25	<.0001	.007
Evidential	340	37.5	942	49.0	17.97	<.0001	.008
Quotative	*282*	*31.1*	*715*	*37.2*	6.49	.0108	.005
Sensory	*49*	*5.4*	*202*	*10.5*	18.1	<.0001	.008
Narrators	*9*	*1.0*	*25*	*1.3*	0.49	.4839*	.001
Total	729	80.4	2041	106.2	41.27	<.0001	.012

Comparing the obtained frequencies with the data reported in Varttala (2001: 126), it can be seen that for medicine, the rate of ELVs is higher than 49.9, similarly as the rate for psychology, which can only be compared to what the scholar reported for a different social science discipline, namely, economics – 74.6. Vázquez and Giner (2008: 186) explain that the softer sciences resort more to epistemic modality since their data are "particularly abstract", mainly originating "from observing patterns of human behavior", and thus "rather imprecise and sometimes may be interpreted even as unreliable". ELVs help readers distinguish between certain and uncertain information, revealing which author's statements are facts and which are beliefs. Lower incidence of ELVs in medicine may result from the respect the discipline has for "the ideal of scientific objectivity", where explicit argumentation to support some view is considered unnecessary in the context of the presented findings (Vold 2006b: 237).

As for variety in the frequencies of different ELV types, judgement is chosen over evidence in both subcorpora, yet this preference is significant in the PSY (57.2 vs 49.0, $\chi^2(1)=12.01$, p=.0005, V=.006), but not in the MED (p=.0701). Psychology authors also use both ELV types definitely more frequently than

medical authors (judgement: 57.2 vs 42.9, evidence: 49.0 vs 37.5). Reliance on judgements is reflected in the difference between the frequencies of judgement and evidential verbs which is larger in psychology than in medicine (8.2 vs 5.4). This may result from increased care with which authors in the softer disciplines make claims about research results and their interpretations (Hyland 1998a: 129), as their control over variables is diminished while chance of obtaining diverse results is increased (Hyland 2006: 37). Markkanen and Schröder (1997: 10) add that the social sciences texts are more debate- and argumentation-oriented, whereas texts in the natural sciences are more factual-oriented.

Significant disciplinary differences are also found in the frequencies of the distinct subtypes of judgement and evidential verbs. Regarding judgements, speculative are chosen over deductive ones by medical (27.1 vs 15.8, $\chi^2(1)=27.21$, $p<.0001$, $V=.012$) and psychology authors (46.9 vs 10.3, $\chi^2(1)=448.41$, $p<.0001$, $V=.034$). Yet, the frequency of speculative verbs is significantly higher in the PSY (<.0001), whereas of deductive, in the MED (<.0001). The inclination of medical authors towards deductive verbs is also reflected in the fact that the difference between the frequencies of both ELV subtypes is smaller in their texts than in the psychology texts (11.3 vs 36.6). This finding suggests that medical researchers draw conclusions from observable data and emphasize how the former have been reached rather than involve themselves in speculations which are more universal, allowing to "express cautious positions", but simultaneously less clear (Vass 2017: 26).

Regarding evidence, quotative verbs are chosen over sensory by medical (31.1 vs 5.4, $\chi^2(1)=163.72$, $p<.0001$, $V=.03$) and psychology authors (37.2 vs 10.5, $\chi^2(1)=286.31$, $p<.0001$, $V=.027$). Still, the difference between the frequencies of both ELV types is only slightly larger in the MED (27.7 vs 26.7), so it seems that both groups of scholars have a good ability to "balance opinion and fact" as well as "express stance when desired", adding "weight to claims by showing that other scholars have similar beliefs" (Vass 2017: 26). All subtypes of evidential verbs are more frequent in the PSY and only the preference for narrators was not statistically significant (p=.4839). Narrators are very infrequent in both disciplines, suggesting that the scholars openly admit their contribution to the achievement of the study goals (Hyland 1998a: 125).

4.2. Most prominent ELVs

Table 4 shows the most prominent ELVs in the two disciplines, highlighting those with the relative frequency of n/10,000>1.5. Many of these verbs are often mentioned as prominent in academic English (e.g. Hyland 1998a; Vold 2006b; Dontcheva-Navratilova 2018). The low frequency of items like *claim*, *believe*, *speculate*, *suspect* in RAs was also reported by Hyland (1998a: 126-127). In turn,

the increased popularity of *demonstrate* and *observe* as well as *show* and *report* in medical RAs was observed by Fløttum et al. (2006: 233, 239). In line with Vold's (2006b: 234) findings is the absence of *appear*, *assume* and *seem* among the most prominent ELVs in the MED, which she explains by their subjective nature involving personal evaluation. This style of writing, as Fløttum et al. (2006: 261) claim, is not typical of medical authors who advocate "a stronger presence of an objectivist ideal of science".

Table 4. Most prominent ELVs in the subcorpora (n/10,000>1.5)

Subcorpus	**Medicine**		**Psychology**	
Type of ELV	Speculative	Deductive	Speculative	Deductive
Judgement	consider (8.3) suggest (5.2) indicate (4.1) predict (3.6) know (1.9)	estimate (6.8) demonstrate (5.2) calculate (4.2)	indicate (11.5) suggest (10.3) predict (8.7) consider (5.8) expect (4.0) know (1.9) assume (1.9)	demonstrate (5.1) estimate (2.5) calculate (2.2)
Evidential	Quotative	Sensory	Quotative	Sensory
	show (14.7) report (12.7) note (2.5)	observe (3.6)	report (15.3) show (15.0) note (3.1) suggest (1.6)	appear (3.3) observe (2.7) notice (1.9) seem (1.8)

Psychology authors used a wider variety of frequent ELVs: 18 in total (judgement: 10, evidential: 8) than medical authors: 10 in total (judgement: 8, evidential: 4). In social sciences, the verification of hypotheses is rarely unequivocal, therefore scholars emphasize the interpretative over the empirical, involving themselves in a more elaborate discourse that creates knowledge through mutual understanding with readers and the promotion of plausible reasoning rather than through the indisputability of experimental findings.

Considering variation in the expression of judgement, psychology authors are more inclined towards speculative verbs (7 items vs 5), which seems to be a feature of the softer disciplines (Panocová and Lukačín 2019: 135). Particularly frequent are *suggest* (10.3 vs 5.2, $\chi^2(1)=18.63$, $p<.0001$, $V=.0081$), *indicate* (11.5 vs 4.1, $\chi^2(1)=37.16$, $p<.0001$, $V=.0115$) and *predict* (8.7 vs 3.6, $\chi^2(1)=22.56$, $p<.0001$, $V=.0089$). *Expect* and *assume* are infrequent in medicine, whereas *know* has the same frequency in both disciplines. *Consider* is the only prominent speculative verb, whose relative frequency was on average higher in the medical texts (8.3 vs 5.8, $\chi^2(1)=5.83$, $p=.0158$, $V=.0045$). As Fløttum et al. (2006: 90, 84) claim, *consider* "is a typical research verb" that refers "to the action or the

activities directly related to the research process", which may explain its popularity in the MED. The presence of prominent deductive verbs is more marked in medicine, where *estimate* (6.8 vs 2.5, $\chi^2(1)=4.5$, p=.0339, V=.004) and *calculate* (4.2 vs 2.2, $\chi^2(1)=8.2$, p=.0042, V=.0054) are significantly more popular than in psychology. This is probably because both verbs imply the experimental nature of research, where fact-finding processes often involve calculation and measurement. *Demonstrate* is also more frequently chosen by medical authors (though p=.0797). Marked presence of deductive verbs in medicine may reflect an increased reliance of the discipline on inferential reasoning that involves drawing logical conclusions, usually based on data.

The expression of evidence seems to be less varied across the disciplines. It can be seen from Table 4 that both disciplines share three quotative verbs and only one sensory verb. This finding indicates that reliance on the reports of other scholars about observed facts is important for medical and psychology authors alike, but provisional rather than assertive presentation of claims, which is aided by sensory verbs, is more essential to the latter. Regarding the shared ELVs, quotative *show* (p=.8065), *report* (p=.088) and *note* (p=.4386) are more frequent in the PSY, whereas sensory *observe* (p=.1809), in the MED, though none of these differences reached statistical significance. Disciplinary differences are particularly significant for the quotative verb *suggest* and the sensory verbs *appear*, *notice* and *seem*, all of which are prominent in the psychology texts. Vold (2006b: 243), who also observed the limited presence of *seem* and *appear* in medicine, argues that the verbs "bear the mark of a personal evaluation and hence the use of these markers signals an openness from the part of the author towards other opinions and interpretations". Such openness may be less necessary in medicine, where scholars tend to work in teams rather than alone,[4] thus sharing responsibility for the research among their group. It should be also noted that none of the evidential verbs labeled as narrators reached the frequency threshold adopted for prominent ELVs. The most frequent narrator was found in medicine: the verb *seek* (1.0).

4.3. ELVs across research article sections

Figure 1 shows that in both disciplines ELVs are the most frequent in Discussions. This is especially the case in the MED, where the distribution of ELVs is fairly even across the first three sections, but it is definitely the lowest in Introductions and almost equal in Methods and Results. In the PSY, ELVs are quite evenly distributed across all rhetorical sections, with Introductions and Results scoring similar – and Methods displaying the lowest – frequencies of

[4] The average number of authors per article was 4.9 in the MED and 3.26 in the PSY.

ELVs. The distribution of ELVs in the psychology texts to a greater extent reflects the trends observed in earlier studies, as the frequency of epistemic modality is higher in the Introduction and Discussion sections in comparison with the Methods and Results sections (Yang et al. 2015: 2). Previous research also reports the preponderance of ELVs in Discussions and their low rate in Methods (e.g. Hyland 1998a; Pérez-Llantada 2010). Essentially, the Discussion offers explanations for the study's findings, highlighting their possible causes and mechanisms, which induces the author to adopt a more discursive style of argument larded with epistemic judgements and evaluations. In turn, the Method does not have to charm readers into accepting new knowledge claims but briefly familiarizes them with the tools and procedures through which these conclusions were reached.

Disciplinary differences are also found in the rates of ELVs in the specific sections, with the Discussion being the only section where the rate of ELVs is higher in the medical texts (41.7 vs 33.6, $\chi^2(1)=11.04$, p=.0009, V=.0062). The psychology texts score higher rates of ELVs in Introductions (27.1 vs 9.4, $\chi^2(1)=90.32$, p<.0001, V=.0179), Results (26.3 vs 14.5, $\chi^2(1)=37.51$, p<.0001, V=.0115) and Methods, though in the latter section the difference was not statistically significant (16.6 vs 14.8, p=.2453).

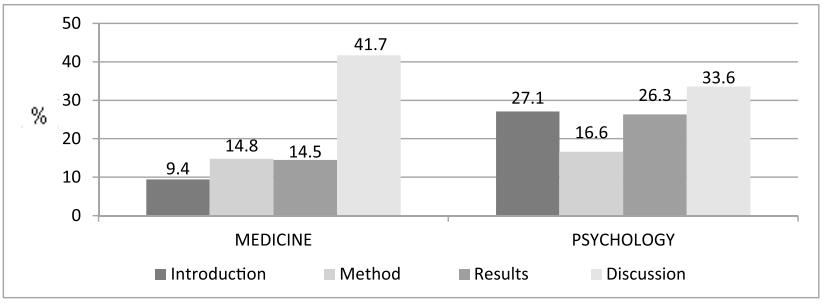

Figure 1. Distribution of ELVs across RAs section

Table 5 shows that medical authors keep a degree of balance between judgement and evidentiality only in the Introduction, as evidenced by the average difference between the normalized frequencies of the two ELV types (diff. – MED: 1.4 vs PSY: 2.3). Psychology authors maintain more balance in Methods (diff. – PSY: 4.4 vs MED: 6.6), Results (diff. – PSY: 0.1 vs MED: 3.7) and Discussions (diff. – PSY: 1.4 vs MED: 4.0). The tendency to interweave more or less evenly judgement and evidence suggests a need to simultaneously limit personal responsibility for the non-factual status of propositions and indicate that the claim has a perceptual dimension to its meaning. This seems to be more desired in the soft disciplines, where writers' engagement with knowledge is more discursive but sometimes also concerned with hard data, whose

interpretation, however, is often relative and therefore needs to be substantiated with additional background information and arguments.

The disciplines also differ in the preferences for judgement or evidentiality in the distinct RA sections. Psychology authors consistently choose judgement in Introductions (16.0 vs 13.7, p=.0656), Results (13.2 vs 13.1, p=.8875) and Discussions (17.5 vs 16.1, p=.3078), but this preference is particularly strong in Methods (10.5 vs 6.1, $\chi^2(1)=22.03$, p<.0001, V=.0076). Medical authors prefer judgement in Methods (10.7 vs 4.1, $\chi^2(1)=26.85$, p<.0001, V=.0122) and, to a lesser degree, in Discussions (22.8 vs 18.8, p=.0644), but opt for evidence in Introductions (5.4 vs 4.0, p=.1583) and especially in Results (9.1 vs 5.4, $\chi^2(1)=8.75$, p=.0031, V=.0069), as also evidenced by Pérez-Llantada (2010) in her biomedical corpus. Strong reliance on evidence in the Results section may be related to the preoccupation with an unbiased presentation of raw data without yet exploring their implications. Pérez-Llantada (2010: 37) also reported a preference for judgement in Methods section, which she attributes to the fact that when detailing methods, writers assume that their readers may potentially disapprove of the research process decisions made in the course of the study.

Disciplinary differences are also reflected in the frequencies of judgement and evidential ELVs, which in psychology are significantly higher in Introductions and Results, whereas in medicine, the frequencies are higher in Discussions. In Methods, the frequency of judgement ELVs is higher in medicine (though p=.8875) and the frequency of evidential verbs is higher in psychology. It should be added that regardless of the discipline, the authors prefer quotative over sensory ELVs, and these two over narrators, and similarly, they choose speculative over deductive judgements, except for the Method, where medical authors use more deductive ELVs. In medicine, emphasis is put on what can be

Table 5. Frequency of judgement and evidential verbs across RAs sections

Subcorpus		**Medicine**		**Psychology**		**Statistics**		
RA section	**Type of ELV**	**no**	**n/10,000**	**no**	**n/10,000**	$\chi^2(1)$	**P value**	**Cramer's *V***
Intro	Judgement	36	4.0	307	16.0	73.16	<.0001	.0161
	Evidential	49	5.4	263	13.7	38.27	<.0001	.0116
Meth	Judgement	97	10.7	202	10.5	0.02	.8875*	.0003
	Evidential	37	4.1	118	6.1	4.77	.029	.0041
Results	Judgement	49	5.4	254	13.2	35.08	<.0001	.0111
	Evidential	83	9.1	251	13.1	7.96	.0048	.0053
Discus	Judgement	207	22.8	336	17.5	9.15	.0025	.0057
	Evidential	171	18.8	310	16.1	2.69	.101*	.0031

calculated or concluded from observable evidence, "making the interpretation of research data less dependent on subjective evaluation than what is the case in the […] social sciences" (Dahl 2004: 1822).

Table 6 adds further details to the above findings, revealing disciplinary preferences for the most prominent ELVs across RAs sections. It can be seen that *show* and *report* are the only verbs, whose distribution across the different parts of the RA is comparable in medicine and psychology, which for the former verb is particularly the case in Results, where its frequency of occurrence is almost the same in the two disciplines. This can be attributed to the multipurpose role these verbs serve in academic writing. They both, as Fløttum et al. (2006: 233, 239) claim, are often "used with bibliographical references as subjects" as well as "in a selection of self- and other-contexts" which allow either the author(s) or other voices manifest themselves in the text. The closest similarities in the authors' preferences for the specific ELVs are found in Discussions, with six shared verbs (*suggest*, *indicate*, *predict*, *demonstrate*, *show*, *report*), then in Methods, with three shared verbs (*consider*, *calculate*, *report*) and Results, with two shared verbs (*show*, *report*). The differences are the greatest in Introductions, with *show* being the only verb shared by the disciplines and with as many as five verbs (*consider*, *suggest*, *predict*, *demonstrate*, *report*) prominent only in the psychology texts.

Another interesting trend observed in psychology is that the authors rely on similar ELVs in Introductions and Discussions, which share five verbs (*suggest*, *predict*, *demonstrate*, *show*, *report*). This is consistent with Swales' (2004: 234) claim that "discussions tend to offer a mirror-image reversal of the move-order in Introductions", yet it is not reflected in medicine, where the two sections share only one verb – *show*. In psychology, five shared verbs are also found in Results and Discussions (*suggest*, *indicate*, *predict*, *show*, *report*), which is also seen in medicine, but only for four shared verbs (*consider*, *demonstrate*, *show*, *report*). Generally, more ELVs shared by at least two RAs sections can be found in psychology than in medicine, which indicates that the latter texts are less internally uniform in terms of their use of ELVs. This finding is consistent with the trend observed by Dahl (2004: 1819) that in medical articles, it is more important to clearly separate research data from their interpretation than to make the text functionally coherent.

4.4. Phraseology of shared ELVs

Since "epistemic elements are not usually selected in isolation; rather, they tend to cluster in formulaic lexical chunks", the focus here is on the recurrent phraseology of the most prominent ELVs, which are shared across the distinct sections of medical and psychology articles (León 2006: 129). As evidenced in

Table 6. Frequency of the most prominent ELVs across RAs sections (n/10,000>1.5)

Type of ELV	Discipline	Medicine				Psychology			
	Section	I	M	R	D	I	M	R	D
Judgement	consider		2.31	1.87	3.52	2.13	1.56		
	suggest				4.52	2.34		1.76	6.08
	indicate				2.64		3.38	3.95	2.7
	predict				2.2	3.06		3.48	1.61
	estimate		1.76		1.54				
	calculate		3.19				1.76		
	demonstrate			1.54	4.19	1.5			2.49
Evidential	show	2.31		4.19	6.83	4.94		4.16	4.89
	report		1.65	3.08	6.5	3.48	2.8	5.41	3.59
	observe				1.54				
	note								1.66

Table 6 above, the disciplines share eight different ELVs – judgemental speculative: c*onsider*, *suggest*, *indicate*, *predict*, and deductive: *demonstrate*, *calculate*, as well as evidential quotative: *show*, *report*.

Consider is found in Methods. In both disciplines, usually the past simple passive form *was/were considered* is used to explain how the investigation was conducted. Passivization allows to tone down the writer's assertions, limiting the risk involved in categorical statements. In psychology a typical subject preceding the verb is *participant(s)* (1), whereas in medicine, it is *patient(s)* (2). In the MED, the passive form is also frequently used to provide the details of the statistical procedures (3).

(1) *The participant was considered an expert if he/she answered 'frequently' […]* (PSY)
(2) *Patients who met these entry criteria were considered eligible for ASCT.* (MED)
(3) *A P value < 0.05 was considered statistically significant.* (MED)

Another shared ELV found in Methods is *calculate*, which in both disciplines is commonly passivized: *was/were calculated*. It usually details how various analytical aspects of the research experiment were determined (4), though in psychology the verb often takes *score(s)* as its subject (5) and it never clusters with *(statistical) significance*, which is found in medicine (6). Disciplinary preferences for recounting the data-analysis procedures are also expressed

through the infinitive *to calculate*, which is common in the MED (7), as well as through the self-mention phrase *we calculated*, which is popular in the PSY (8).

(4) *The observed probabilities were calculated via the Kaplan-Meier method.* (MED)
(5) *The total score for each test was calculated by summing the scores for the […]* (PSY)
(6) *Statistical analyses were performed using Student's t-test, or Fisher Exact test where appropriate, with significance calculated at a p-value <0.05.* (MED)
(7) *The predictions for each model were added together to calculate the total […]*(MED)
(8) *Based on these nominations, we calculated each individual's proportion of […]* (PSY)

Suggest is shared across Discussions, where it serves to interpret the findings. In medicine, the verb, followed by *that*, is most often used in its gerund form to head a dependent clause (9). In psychology, it is usually preceded by such abstract rhetors referring to research-related activities as *results*, *findings*, *evidence*, *research*, as in (10), owing to which "the impersonalisation of the discourse" is possible, as either "the text or the data" become "the source of epistemic judgements" (Hyland, 1998a: 123). The effect of detachment is also achieved through *this suggests that* (11).

(9) *We observed these differences immediately after LDCT, suggesting that the intervention may have potential immediate effects on risk perception.* (MED)
(10) *The findings of the present study suggest that team resilience is developed […]*(PSY)
(11) *This suggests that HFNY may be intervening earlier on in the child's life […]* (PSY)

Indicate is also found in Discussions, where medical authors incorporate it into *this indicates that* to comment on their results (12). Psychology authors prefer to cluster the verb with abstract rhetors, similar to those accompanying *suggest* (13). Impersonal phrases starting with *this* or *it* are less common but sometimes include weak modals, which additionally soften the speculation (14).

(12) *We also found that there were no differences in vaccination […].This indicates that educational strategies should tend to be broad based rather than […]* (MED)
(13) *The current findings indicate that effective self-talk does not directly […]* (PSY)

(14) *It may indicate that for older players other factors than their belief in their own competence are more relevant.*(PSY)

Another shared ELV found in Discussions is *predict*, which enters a recurrent phrase only in psychology, where *as predicted* highlights the validity of initial assumptions (15).

(15) *As predicted, we also found a significant sex difference in the MRT […]* (PSY)

Demonstrate is also shared across Discussions. In medicine, it usually clusters with such abstract rhetors as *study*, *results* and *data*, which are preceded with *this* or *our* to indicate that an explanation is provided as to the current research (16). Similar phrases are less common in psychology, where the verb tends to take *finding* as its subject (17) and is regularly found in the phrase *as demonstrated* (18).

(16) *This study demonstrates that there is scope to further explore these […]* (MED)
(17) *This finding demonstrates that Twitter users communicate their experiences with e-liquids with their friends and followers on Twitter.* (PSY)
(18) *Through the alteration of design elements, the VMWM can be used to measure specific spatial abilities, as demonstrated by the results obtained […]*(PSY)

Show is shared across three sections. In Results, authors in both disciplines report their findings by combining the verb with abstract rhetors denoting visuals, particularly *Figure*, which is more common in medicine, and *Table*, which is more popular in psychology. The most frequent phrases of this kind are exemplified below.

(19) *As Table 2 shows, truth tellers in the Immediate interviewing condition* (PSY)
(20) *As shown in Fig. 4, mAb 14E2 bound to all 6 cell lines and was […]* (MED)
(21) *Responses to the case based questions are shown in Fig. 2.* (MED)

Less common, especially in medicine, are phrases referring to various research activities (22) or outcomes (23).

(22) *Time-to-event analyses showed that the risks of recurrent venous […]* (MED)
(23) *The results showed that SL in the VPTs negatively correlated with MR […]* (PSY)

In both disciplines, the use of *show* to refer to visuals is less common in Discussions and definitely absent in Introductions. Instead, the verb serves to introduce previous research in the field. Reference to other scholars is made by combining *show* with their names (24), which are replaced with abstract rhetors, sometimes preceded by *earlier* or *previous*, when mention is made of their research (25). The latter is frequent in psychology.

(24) *For example, Abraham and Sheeran (2004) showed that people who feel […]* (PSY)
(25) *Research has consistently shown that peer groups and their associated norms are important for development (Brown, 2004).*(PSY)

In Discussions, *show* is often combined with *study*, *results*, *findings* or *data*, which are sometimes preceded by *our*, *this*, *the present* to indicate that reference is made to the current research, as illustrated by (26).

(26) *This study shows that patients who are prescribed life-long antibiotic therapy can be carriers of multi-resistant organisms […]* (MED)

Report is also shared across three sections. In Methods, both disciplines – particularly medicine – rely heavily on the passive forms of the verb. Sentences like (27) and (28) are commonly used to describe the study design. In psychology, *report* is also often preceded by *participant(s), respondent(s)* or other expressions denoting the experimental participants (29), including percentage numbers (30). It should be noted, however, that such sentences serve to provide background information on the research group, not to present the findings.

(27) *This work has been reported in line with the STROCSS criteria [15].* (MED)
(28) *Scores are reported on the RIT scale, which ranges from roughly 120 […]* (PSY)
(29) *All participants reported normal or corrected-to-normal color vision.* (PSY)
(30) *In the initial sample, 61% of students were Caucasian and minority ethnicities represented were […];and 7% reported "other."* (PSY)

In Results, *report* is also willingly combined with words like *participants*, *respondents*, *trainees* or *patients*, which is found in both disciplines. Yet, as example (31) indicates, in this section such phrases are used to describe research results. In psychology, the verb is also commonly combined with the surnames of other researchers to relate the current findings to those of similar studies (32).

(31) *Health-related patient reported quality-of-life subscales, […]* (MED)
(32) *Similarly, Karageorghis and Jones (2014) reported significant differences in flow across music tempo conditions […]*(PSY)

The use of *report* to refer to other scholars and their research is particularly common in Discussions, where sentences like (33) or (34) are found in both disciplines. Additionally, in the Discussion section, the verb is often used to restate and explain results, as illustrated by (35). This also includes self-mention phrases (36).

(33) *Emil et al. (2014) reported a similar median day of diagnosis of 8 days […]*(MED)
(34) *There are some potential explanations for the discrepancy between results from the current study and those reported by Colman et al. (2016).*(PSY)
(35) *The present study's findings reported how the team held regular […].* (PSY)
(36) *We also report a mean hospital length of stay of 1.5 days, […]*(MED)

What is not shown above but was observed during the analysis is the avoidance of personal presence in medical writing. Indeed, medical authors combined ELVs with first person subjects only 38 times, in contrast to psychology authors, who used this combination 103 times. This correlates with Hyland's (2017: 10) finding that soft sciences writers use *I* or *we* almost three times as often as their hard sciences colleagues, which helps "construct an authoritative self" and emphasize one's contribution. The more evident presence of authors in psychology articles leaves readers little space for own evaluation of statements, which, according to Hyland (1996: 265), is possible when ELVs are used "with impersonal phrasings". Psychology authors need to be overtly persuasive, since their research data are less likely to speak for themselves.

Conclusion

The main aim of the study was to examine disciplinary variation in the frequency, prominence, distribution and phraseology of selected ELVs across the rhetorical sections of RAs in medicine and psychology. The results show that disciplinary affiliation affects the authors' preferences in this regard, reflecting the nature of knowledge and the styles of its presentation in each discipline.

Summarizing the main findings, psychology authors use significantly more ELVs than medical authors do. Yet, although both groups are more inclined towards speculative judgements and quotative evidence, and tend to neglect narrators, all ELV types are more frequent in psychology, except for deductive verbs, which are more common in medicine. The latter is particularly evident in the Methods section. In both disciplines, there is a preponderance of ELVs in Discussions, which however is less manifest in the psychology articles, where the selected ELVs are distributed more evenly across the rhetorical sections. Also,

the interplay of judgement and evidence is more balanced in the psychology subcorpus. A more diverse range of frequent ELVs is found in the psychology texts, where the verbs are often combined with self-mention, reflecting the more discursive and dialogic character of the discipline. Discipline-specific choices of psychology authors are most evident in the preference for the speculative verbs *expect* and *assume*, quotative *suggest* as well as sensory *appear*, *notice* and *seem*. These ELVs are rarely chosen by medical writers, whose authorial presence is less evident in their texts. Interestingly, although both disciplines share many of the examined ELVs, disciplinary differences are observed not only in their frequency distributions but also in their phraseology in the distinct RA sections.

The main limitation of the study is the proper interpretation of the contextual meaning of the target items which may vary from researcher to researcher. Another potential source of bias for the study is the extent to which style editing of the considered journals or even reviewers' suggestions could have influenced the authors' choice of ELVs. It should be also noted that the Chi-square test that was used to evaluate the significance of disciplinary differences, despite being the most popular statistics in corpus linguistics, is considered by some scholars as inadequate for describing the lexical variations between corpora (see Bestgen 2017). The observed frequencies of ELVs do indicate that medicine and psychology use these markers differently, as evidenced even more clearly by their dissimilar phraseological behaviour. Yet, caution should be exercised when considering the statistical significance of these disparities, especially that all Cramer's *V* values indicate weak effect sizes. Nevertheless, the study has the potential for familiarising academic writers with the communication patterns involved in providing the discursive structure of disciplinaryknowledge in medicine and psychology. Further research could analyze the same selection of ELVs in texts from other fields of study, especially those related to the hard sciences like physics or chemistry. It would be also worth investigating which levels of epistemic strength are preferred in the distinct RAs sections.

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