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Metadiscursive nouns: interaction and cohesion in abstract moves

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Highlights

- The rhetorical use of nouns has been less fully explored in the research of abstracts.
- We illustrate the interactive and interactional functions of what we call metadiscursive nouns in 240 abstracts from six disciplines.
- These nouns are frequently used to frame and manage arguments across moves in the abstracts.
- They also help writers persuade readers of the relevance of their research to the discipline.
- They should figure in advanced writing for publication courses.

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Abstract

Research article abstracts have become an important genre in all knowledge fields, playing a crucial role in persuading readers, and reviewers, to take the time to go further into the paper itself. This promotional aspect of abstracts is well known, but less discussed is the ways writers are able to skilfully foreground their claim, package the information in a cohesive and coherent manner, and craft a disciplinary stance. One such rhetorical strategy is what we are calling *metadiscursive nouns*. Nouns such as *fact*, *analysis*, and *belief* are common in abstracts and do a great deal of rhetorical work for writers. In this paper we explore the interactive and interactional functions they perform in the rhetorical moves of 240 research abstracts from six disciplines. The results show how these nouns are frequently used to frame and coherently manage arguments while, at the same time, helping writers to claim disciplinary legitimacy and promote the value and relevance of their research to their discipline.

Keywords: abstracts; metadiscursive nouns; interaction; cohesion; persuasion

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1. Introduction

Social interaction in academic writing has attracted considerable attention in recent years, with features such as citation, hedges, first person pronouns, boosters and directives among those investigated (e.g. Hyland, 2004, 2005; Biber, 2006). One familiar feature which has been less fully explored, however, is the use of nouns to promote the writer's persuasive goals. While a substantial literature has discussed the importance of nouns in organising cohesive discourse (e.g. Francis, 1986; Flowerdew & Forest, 2015) we propose a more rhetorical function for them. In this paper we introduce a category we call *metadiscursive nouns* (such as *fact*, *analysis*, and *belief*) and illustrate the interactive and interactional functions they perform in the moves of 240 research article abstracts from six disciplines. In doing so we hope to show that nouns do not merely contribute to the objectified and abstract character of academic prose (e.g. Halliday, 2003; Sword, 2012) but play important interpersonal and rhetorical functions. More specifically, we attempt to demonstrate how these nouns help the writers organise their arguments and persuade disciplinary peers of their claims to achieve communicative purposes in different moves. Finally we suggest some pedagogical implications of the work.

2. Metadiscursive nouns

The term metadiscursive noun was first used by Francis (1986) interchangeably with "anaphoric nouns", referring to the cohesive function of nouns but giving no explanation of all its metadiscursive functions. We define metadiscursive noun as those which refer to the organisation of the discourse or the writers' attitude towards it. We see them as a sub-set of abstract nouns and distinguished from them by their unspecific semantic meaning. So while the meaning of an abstract noun is constant across contexts (e.g. *society*, *democracy*) metadiscursive nouns have both this constant meaning and a variable, pragmatic meaning which depends on contextual lexicalisation. They assist writers to point to material somewhere in the

current context and shape how the reader should understand that material, thus performing both stance-taking (interactional) and cohesive (interactive) roles in a text.

Thus these nouns enable writers to organise cohesive discourse, express viewpoints on content and interact with readers as members of a particular community. They have metadiscursive functions, as we can see in (1) to (5). In all examples, bold indicates the metadiscursive noun, with specifying information underlined and demonstrative determiner italicised.

> (1) This research examines the **notion** that guilt, the negative emotion stemming from a failure to meet a self-held standard of behavior, leads to preferences … to the original source of the guilt. [Marketing]
>
> (2) We show that *these* opposing **tendencies** cause environmental entanglement through superpositions of adiabatic and antiadiabatic oscillator states, which then stabilizes the spin coherence against strong dissipation. *This* **insight** motivates a fast-converging variational coherent-state expansion... [Physics]
>
> (3) The **aim** of *this* **study** was to determine if differences in coronary endothelial function are observed between … magnetic resonance imaging in response to cold pressor stress, an established endothelium-dependent vasodilatory stress. [Medicine]
>
> (4) According to the traditional **view**, children can learn a L2 to a level indistinguishable from that of native speakers. [Applied linguistics]
>
> (5) Hence, indirect sensitivity accounts cannot fulfill their purpose of explaining our intuitions about skepticism. *This* is the hard **problem** for indirect sensitivity accounts. [Philosophy]

"Notion", "tendency", "insight", "aim", "study", "view" and "problem" are metadiscursive nouns and their vagueness is remedied by immediate reference. Thus it is unclear what "notion" refers to in (1) until it is specified cataphorically in the subsequent complement clause, while "tendencies" and "insight" in (2) are specified anaphorically in the previous discourse. Although

"study" in (3) is also attended by demonstrative *this* (like "insight" in 2), we do not see this as a retrospective marker but one which signals prospectively towards the research that follows in the full article. Nouns such as *paper, article* and *essay* work in a similar way, and this is more typical in abstracts than other genres (see Francis, 1986; Flowerdew & Forest, 2015). "View" in (4) is slightly different as it relies on readers summoning a referent from their background knowledge.

The specification of meaning provides the necessary referent for the metadiscursive noun while the metadiscursive noun indicates how the specifics are intended to be understood in relation to the surrounding discourse. Metadiscursive nouns typically preview or review material, linking current with other information, whether inside or outside the text. This helps writers to create more cohesive arguments and thus assists readers to gain a better comprehension of the text. These examples also exhibit the four most frequent lexico-grammatical patterns in which metadiscursive nouns are used, that is, *N + post-nominal clause* (as in example 1); *Determiner + N* (2; 4); *N + be + complement clause* (3); *Determiner + be + N* (5) respectively (Schmid, 2000). We can, therefore, see metadiscursive nouns as a rhetorical feature of textual interaction, recognizing the presence of readers, acknowledging their knowledge-base and appealing to them as discourse participants. We name them metadiscursive nouns to emphasise that these nouns set up writer-reader interactions in texts in similar ways to metadiscourse, performing both interactive and interactional functions. The former referring to the writer's management of a cohesive flow of information to guide readers through the text, and the latter concerning his or her explicit interventions to comment on and evaluate material (Hyland, 2005).

In the *interactive* dimension, metadiscursive nouns either refer backward, to encapsulate earlier material into the ongoing discourse (see the anaphoric use of "tendency" and "insight" in example 2), or forward to predict forthcoming information (see the cataphoric use of "notion" in example 1 and "aim" in example 3). They therefore work to signal the relationships between parts of the text and address readers' potential processing needs. This interactive function

suggests a writer's awareness of a participating audience and the ways the text must accommodate its probable knowledge, rhetorical expectations and processing abilities. The writer's purpose here is "to shape and constrain a text to meet the needs of particular readers, setting out arguments so that they will recover the writer's preferred interpretations and goals" (Hyland, 2005, p. 49).

The *interactional* dimension highlights the writer's stance and attempts to engage with readers. Metadiscursive nouns here perform evaluative and engaging roles, either expressing writer's stance to the message or involving readers as discourse participants through appeal to shared knowledge and awareness of rhetorical practices. For example, "insight" in (2) indicates the writer's positive acknowledgment of the prior clausal message while "problem" in (5) expresses the writer's negative attitude towards the underlined material information in the above sentence. "View" in (4), on the other hand, engages readers by orientating them towards a conventional wisdom. Here, the writers' goal is "to make his or her views explicit and to involve readers by allowing them to respond to the unfolding text" (Hyland, 2005, p. 49). This is the writers' projection of a community-recognised persona and exhibits the ways they convey judgments, align with readers and respond to an imagined dialogue with them.

A complex and extensive literature has discussed the importance of these nouns and their frequency in academic discourse, but research has almost exclusively addressed their cohesive rather than interactional functions. Under a range of different names, authors have mainly discussed how nouns function to organise the discourse rather than carry the stance of their writers. Thus, Halliday and Hasan (1976) talk of *general nouns* as establishing lexical cohesion through the generalised reference within the major noun classes such as *idea* and *business*. Francis (1986) elaborates on the anaphoric features of what she calls *anaphoric nouns*, while Tadros (1985) talks of *enumerable nouns* which predict upcoming discourse. Ivanič (1991) analyses the in-clause as well as the across-clause organising function of nouns, using the term *carrier nouns*. Although Schmid's (2000) *shell nouns* and Flowerdew & Forest's (2015)

signalling nouns are large-scale studies of this type of noun, they treat them as "conceptual shells" from a cognitive standpoint and cohesive signals from a discourse perspective respectively. Tahara (2014) refers to 'metadiscursive nouns' as a way of synthesising these prior studies, but she also fails to recognise the dual functions we are attributing to them.

While Charles (2003, 2007) and Jiang & Hyland (2016) have turned their attention to the interactional dimension of these nouns, this is largely unchartered territory. Most centrally, our analysis seeks to recognise the dual rhetorical functions of these nouns, both through the more inclusive and straightforward name of metadiscursive noun, and by exploring how these nouns establish textual interaction by contributing to both the construction of cohesive and stance in article abstracts.

3. Academic abstracts

We chose to explore metadiscursive nouns in abstracts both because of the importance of this genre and because it is the 'hard case' for what we are discussing. Unlike articles, monographs or dissertations, abstracts are a compact genre which do not involve long cohesive chains nor develop detailed argument. Thus we would not expect to find metadiscursive nouns deployed in them to link up stretches of discourse and express the writer's authorial stance towards content. However, as (6) shows, this is exactly what we do find. This is an abstract from a marketing journal, and the 12 metadiscursive nouns it contains play key roles in helping to glue the text together as cohesive discourse and project forward to the accompanying article, while also offering the writer's personal interpretations at various critical points.

(6) This **research** examines the **notion** that guilt, the negative emotion stemming from a **failure** to meet a self-held standard of behavior, leads to preferences for products enabling self-improvement. Examining consumer responses to real products, this **research** shows that such **effects** arise because guilt — by its focus on previous wrongdoings — activates a general **desire** to

improve the self. This **increase** in desire for self-improvement products is only observed for choices involving the self and is mitigated when people hold the **belief** that the self is nonmalleable. Building on past work that focuses on how guilt often leads to the **motivation** to alleviate feelings of guilt either directly or indirectly, the current **research** demonstrates an additional, novel downstream consequence of guilt, showing that only guilt has the unique motivational **consequence** of activating a general **desire** to improve the self, which subsequently spills into other domains and spurs self-improving product choices. These **findings** are discussed in light of their implications for research on the distinct motivational consequences of specific emotions.

In terms of their importance, a substantial literature underlies the significance of abstracts in helping writers to promote their research and readers to filter the deluge of literature which confronts them. It is generally the readers' first encounter with a research article, and is often the point at which they decide whether to give the accompanying article further attention, or to ignore it. Huckin (2001, p. 93), for example, sees abstracts as serving a number of important functions: they are "mini-texts", giving readers a brief summary of a study; "screening devices", helping readers decide whether to read the whole article nor not; and "previews", creating a road-map for those who intend to read the whole article. Its high-stakes nature can also be seen in the review process, impacting either the referees' interest in reviewing it (Hyland, 2015) or their rating of the promoted research (Cutting, 2012). Just avoiding desk rejection can depend on the writer being sufficiently rhetorically savvy to make best use of this promotional window (Hyland, 2004; Pho, 2008). The entire study might stand or fall in less than 200 words.

Claims have to be presented succinctly and framed within an authorial stance which recognises both existing discursive practices and current disciplinary perspectives (Hyland, 2004; Sala, 2014; Samraj, 2005). The limited textual space available (an average of 183 words in this study),

however, makes this persuasive endeavour rhetorically tricky, requiring writers to package their argument in a way which is not only succinct, but also recognisable to a disciplinary audience and which acknowledges its likely response to the authorial perspective taken (Thompson, 2001, p. 61). The impact of a text thus results from two main rhetorical strategies which Hyland (2012) refers to as *proximity*, or how writers situate themselves in relation to the readers by their use of the familiar discursive conventions of the discipline, and *positioning*, or the stance they adopt to the message they present.

The realisation of these authorial practices has been examined in abstracts in terms of reporting verbs (Stotesbury, 2003; Huckin, 2001; Hyland & Tse, 2005; Sala, 2014), self-mention (Bondi, 2014; Pho, 2008), grammatical subjects (Ebrahimi & Chan, 2015) and hedging and boosting (Gillaerts, 2014; Pho, 2008; Salager-Meyer, 1992). Research has also focused on move structures (e.g. Dos Santos, 1996; Hyland, 2004; Lorés, 2004), and their linguistic features (e.g. Bondi & Lorés Sanz, 2014; Hyland & Tse, 2005). Nouns, however, have only received a passing mention (e.g. Swales & Feak, 2009; Bondi & Lorés Sanz, 2014) and there have been no systemic investigations into their rhetorical functions in this genre. Despite this, Ventola has noted a "tendency to nominalize in the abstracts" (1994, pp. 344) and Kretzenbacher (1990) found that nouns comprised 25% of words in abstracts and only 15%-29% of the words in their accompanying articles. Cutting (2012) further shows a correlation between reviewers' evaluation of abstracts submitted to a conference and the general nouns used in them.

Given this importance of abstracts, the likely importance of nouns in them, and the relative neglect they have received in the literature, we attempt to fill this gap while exploring the new concept of metadiscursive noun. We address the following main questions:

(1) How do metadiscursive nouns set up anaphoric and cataphoric reference in abstracts and organise cohesive discourse?

(2) What stance do writers express by their choice of metadiscursive nouns and how do they engage readers?

(3) To what extent do the above interactive and interactional functions of metadiscursive nouns differ across broad disciplines and rhetorical moves in abstracts?

4. Corpus and analytic procedures

The study is based on a corpus of 240 article abstracts accompanying journal articles published after 2010 in six disciplines (applied linguistics, marketing and philosophy; electronic engineering, medicine, and physics). We seek to offer a broadly representative picture of writing in published research by selecting papers from disciplines in the soft-knowledge fields (applied linguistics, marketing and philosophy) and from electronic engineering, medicine, and physics to illustrate the practices of the physical sciences (Becher & Trowler, 2001). Four abstracts were taken at random from each of the 10 journals in each discipline which had achieved the top ranking in their field according to 5-year impact factor published by Thomson Reuters's *Web of Knowledge ISI* in 2015 (Appendix 1).

To explore the rhetorical use of metadiscursive nouns in different moves, we adopted a top-down approach (Biber et al., 2007), first categorizing moves in terms of their communicative functions and then investigating the role of metadiscursive nouns in each move. This procedure helps to avoid the "circularity of the identification of rhetorical moves and linguistic realizations" in many studies of abstracts (Pho, 2008, p. 233). Our starting point for identifying moves was research by Dos Santos (1996), Stotesbury (2003), Hyland (2004), Pho (2008) and Ebrahimi and Chan (2015) which confirms a five-move structure of Introduction, Purpose, Methods, Results and Conclusion. Based on the IMRD pattern, this structure is useful as it allows comparisons to be made across disciplines by folding a 'hypothesis' move used by some sciences only (e.g. ANSI/NISO, 2015) into a purpose move. Gillaerts (2013, p.51) further notes that this is the most common structure and the most consistent across time. The five move structure, shown in Table 1, also provided the most robust description of our data.

Table 1 Categorisation of moves in article abstracts (Dos Santos, 1996; Hyland, 2004)

Move	Function
Introduction	Establishes context of the paper and motivates the research or discussion.
Purpose	Indicates purpose, thesis or hypothesis, outlines the intention of the paper.
Methods	Provides information on design, procedures, assumptions, approach, data, etc.
Results	States main findings or results, the argument, or what was accomplished.
Conclusion	Interprets or extends results beyond scope of paper, draws inferences, points to applications or wider implications.

Having divided our corpora into these five move categories, we searched each move for metadiscursive nouns, and then attributed each one to either an anaphoric or cataphoric use in the interactive category and to a particular stance option in the interactional category.

We coded all the moves, metadiscursive nouns and their lexico-grammatical patterns, using MAXQDAplus (2012), a qualitative data analysis tool. The full coding scheme and a sample coded text are given in the Appendix 2. To increase the reliability of the research, we conducted a two-step process of internal double checking by each independently coding a 10% sample to (1) classify the function of text segments to determine the robustness of the five-move categorisation and (2) classify the metadiscursive nouns in the sample into the interactional categories discussed in Table 6. We achieved 97% and 95% agreement in these two steps.

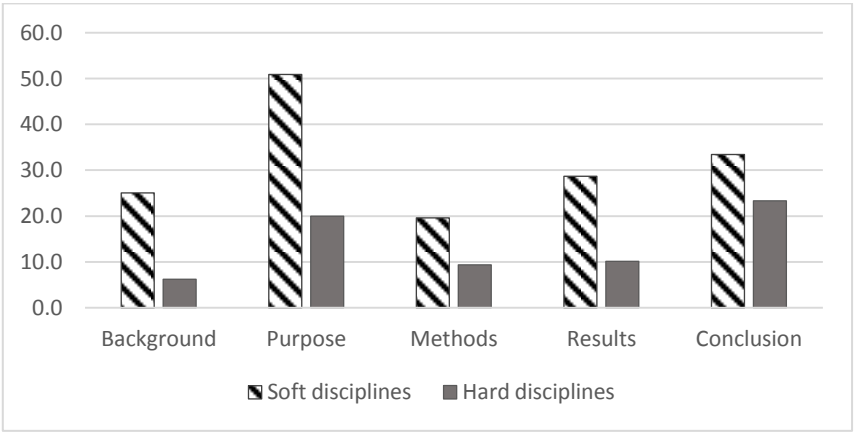
5. Overall results: disciplinary variation and lexico-grammatical patterns

The 240 abstracts contained 859 moves, with 91% containing a *purpose* move, 87 % a *results move*, 70% *methods*, 65% *background* and 56% *conclusion*. In these moves, we identified 824 metadiscursive nouns, averaging 18.8 cases per 1000 words and 3.4 in each abstract. As with Hyland & Tse's (2005) analysis of evaluative *that* constructions in abstracts, which occurred 1.2 times in each abstract, this high frequency of metadiscursive nouns shows that authors are strongly inclined to step into this restricted textual space. They seek to interact explicitly with

readers to "hook the reader" (Hyland & Tse, 2005). Significantly more metadiscursive nouns were found in the soft disciplines, with 28.6 cases vs. 12.3 cases per 1000 words in the sciences (*log Likelihood* (*LL*) = 147.83, $p < 0.001$). This difference is especially striking when we consider that the social science abstracts average 16.5 words or fewer (169.1 words in soft fields and 196.9 words in the hard sciences). Authors in the soft knowledge fields are far more inclined to intervene in their abstracts, as other studies confirm (e.g. Bondi & Lorés Sanz, 2014; Pho, 2008; Stotesbury, 2003).

Authors make particularly heavy use of metadiscursive nouns in the *purpose* move, amounting to 32.1 cases per 1000 words. However, this is not the case in all disciplines. Figure 1 shows that while writers in soft disciplines use metadiscursive nouns most frequently to convey a *purpose*, with 32% of all cases, those in the physical sciences use them more in the *conclusion* move, where they comprise 34% of the total. This difference suggests an awareness of readers' needs given the accepted epistemological beliefs regarding how knowledge is best represented. Applied linguists, philosophers and marketers employ nouns predominantly to establish background importance and present a valued purpose for the research. In electrical engineering, medicine, and physics, this tends to be less important than projecting the significance of the results to colleagues and those in related applied fields who can make use of them.

Figure 1 Disciplinary variation in metadiscursive nouns across moves (per 1000 words)



Hyland (2004, p. 70) points out that a crucial aspect of disciplinary knowledge-making is "the extent to which fields agree on a common set of outstanding problems and appropriate

procedures for pursuing them". Compared with hard domains, relevant topics and specific audiences are often less well-defined so researchers invest more rhetorical effort to identify and discuss problems. As Becher & Trowler (2001, p. 28) have it, soft disciplines are characterised by "divergent and loosely knit" disciplinary knowledge configurations and "rural modes of research activity" where authors are often required to venture into other disciplines and discursive sites to draw on wider knowledge frames, theories and data. Writers have to work much harder to acquaint readers with the area to be discussed and the importance of their research goals, rhetorically constructing why their research has value and significance. The following examples are typical of this discursive effort.

(7) Following a suggestion from Margaret MacDonald, I consider the **view** that political philosophers can contribute by drawing attention to relatively neglected values. I develop *this* **view** to add the **possibility** that political philosophers can try to correct a situation in which a particular value, though important, can come to be too highly emphasised. [Philosophy, purpose]

(8) Therefore, *this* **paper** seeks to address *this* **gap** by exploring consumers' **awareness** of varying levels of corporate citizenship activities and assessing their moral responses to *such* **efforts**. [Marketing, purpose]

By contrast, authors in hard disciplines tend to invest greater effort in the *conclusion* move, to establish the practical or real world value of their research:

(9) Through *this* **simulation**, we show that *such* a sufficient **model** provides a realistic prediction for PLL stability. [Electronic engineering, conclusion]

(10) Our results highlight the **ability** of chemical modifications in the gap region to produce profound changes in ASO behavior. [Medicine, conclusion]

This move typically takes the reader from the text into the world by commenting on the implications of the research or its applications (Hyland, 2004). Scientists explicitly emphasise the significance and application value of the research, either to the discipline or to the wider

community. This is also recommended in scientific style guides such as the *Guidelines for Abstracts* published by ANSI (American National Standard Institute).

> Conclusions can be associated with recommendations, evaluations, applications, suggestions, new relationships, and hypotheses accepted or rejected. (ANSI/NISO, 2015, p. 5)

Interestingly, *conclusion* is the only move in which the ANSI guide stresses the evaluative and rhetorical work to be done and while the influence of the style manual on authors' use of metadiscursive nouns is unclear, we can see the importance that sciences attach to the rhetorical and evaluative weight in the *conclusion* move.

In terms of grammatical patterning, Table 2 shows that the "determiner + N" pattern is the most common overall, comprising 78.3% of all occurrences, followed by the "N + post-nominal clause" pattern, which makes up 15.7%. These two patterns thus account for nearly 90% of all cases.

Table 2 Overall frequency of the four lexico-grammatical patterns

Lexico-grammatical patterns	**Total cases**	**% of cases**
Determiner + N	645	78.3
N + post-nominal clause	129	15.7
N + be + complement clause	46	5.6
Determiner + be + N	4	0.5

In another study of nouns, Flowerdew & Forest (2015) observe that the "determiner + N" and "N + post-nominal clause" patterns make up 82% of all noun patterns in journal articles and textbooks, with the "N + be + complement clause" and "determiner + be + N" patterns comprising 13% and 5% respectively. A comparison with their results indicates that the limited textual space available to abstract writers shifts possible choices towards the two simpler patterns with no predicative extension. Thus, example (11) shows that "this problem" is more concise than "the main objection to the descriptive view is that …" found in (12).

(11) *This* **paper** considers open-shop scheduling with no intermediate buffer to minimise total tardiness. *This* **problem** occurs in many production settings... [Electronic engineering, background]

(12) The main **objection** to the descriptive view is that it fails to include the common-sense idea that stereotyping is always objectionable.
[Philosophy, purpose]

Overall, *paper*, *study* and *result* are the three most frequent metadiscursive nouns in our corpus, which contrasts with *study*, *data* and *research* which Cutting (2012) found to be the most frequent general nouns in conference abstracts. The reason for this is that almost 90% of the texts in Cutting's study referred to incomplete research so the most frequent general nouns depicted ongoing research whereas the most frequent nouns in our study denote the completeness of a research as a *paper* or present the *result* of a complete study.

6. Interactive dimension: anaphoric and cataphoric cohesion

In the interactive dimension, there are 566 cases of anaphoric use of metadiscursive nouns in contrast to 258 cataphoric cases; which is a ratio of almost 3:1. This heavy stress on anaphoric uses seems surprising in a genre which precedes the research article it seeks to promote. As the following extracts illustrate, however, writers lay more emphasis on a retrospective connection with the information they have mentioned in the prior discourse (13) or preceding sentence (14) within the abstract, indicating their concern with creating a cohesive and self-contained argument.

(13) Our finite-temperature simulations bring out interesting aspects, namely that the heat capacity curve is flat, even though the ground state is symmetric. *Such* a flat **nature** indicates that the phase change is continuous. *This* **effect** is due to the restricted phase space available to the system. *These* **observations** are supported by ...
[Physics, results]

(14) The third way, the third degree, holds that properties themselves are the source of physical modality. *This* is the powers' **view**. I examine four ways of developing the third degree:… [Philosophy, methods]

Table 3 shows that interactive use of metadiscursive nouns display interesting variations across different moves with the proportion of cataphoric and anaphoric uses changing as writers proceed through their text, anticipating readers' changing processing needs as they go.

Table 3 Interactive use of metadiscursive nouns across rhetorical moves (per 1000 words)

	background	**purpose**	**methods**	**results**	**conclusion**
Anaphoric	**11.4**	**17.6**	**8.6**	**12.1**	**18.3**
Deter + N	11.3	21.6	8.3	12.1	18.0
Deter + be + N	0.1	0.0	0.3	0.0	0.3
Cataphoric	**7.1**	**14.5**	**4.5**	**5.4**	**7.3**
N + compl	3.9	5.6	2.0	3.3	3.8
Deter + N	1.8	4.3	2.2	1.4	3.3
N + be + compl	1.4	4.6	0.3	0.7	0.3
Total	**18.5**	**32.1**	**13.1**	**17.5**	**25.6**

As we have noted, considerable rhetorical effort is invested in establishing the purpose of the research then, as the discourse proceeds from the *background* to *methods*, the ratio of anaphoric nouns increases. Moving from broad domain knowledge to the specific study, writers strengthen cohesive ties with the prior move, and so make the rationale for their research more apparent. Examples (15) and (16) are typical.

> (15) Differing from *this* conventional **approach**, *the* current **study** focuses on the perceived authenticity gap between national brands and private labels, to explore whether and how *this* **factor** influences the effect of marketing and manufacturing variables on willingness to pay. [Marketing, purpose]

> (16) *The* **paper** mathematically formulates *the* **problem** by a mixed integer linear program. [Electronic engineering, methods]

From *methods* to *results*, writers employ more metadiscursive nouns overall and increase cataphoric uses, aiming to suggest relationships in the findings of their research as in (17) or to highlight connections to wider disciplinary knowledge (18). Finally, the *conclusion*s contain the highest frequency of anaphoric uses with 18.3 cases per 1000 words.

(17) These examples raise an easy problem for indirect sensitivity accounts that claim that there is only a tendency to judge that insensitive beliefs do not constitute knowledge, which still applies to our **beliefs** that the skeptical hypotheses are false. [Philosophy, results]

(18) Calibrated optical measurements indicate that a peak reflectivity close to 92% has been achieved for visible wavelengths, despite the **fact** that silicon has strong absorption in the visible wavelength range.
[Electronic engineering, results]

Coming early in the text, the *purpose* move contains the highest number of cataphoric cases (14.5 per 1000 words), and the "N + be + complement clause" pattern is used most frequently in this move. This structure helps to foreground the purpose of the study, with the metadiscursive noun cataphorically predicting the content in the complement, highlighting the aim and value of the research and simultaneously shaping a cohesive flow of information. Here are two examples.

(19) The **purpose** of this article is to analyze the strategies used by bloggers to communicate and recontextualize scientific discourse in the realm of science blogs. [Applied linguistics, purpose]

(20) Our **aim** was to determine whether hepcidin is increased in EPP/XLP patients, resulting in decreased enteral iron absorption and IDA.
[Medicine, purpose]

While the interactive functions of metadiscursive nouns varies across rhetorical moves, Table 4 shows that disciplinary differences add to the complexity of how these nouns perform in this dimension.

Table 4 Interactive use of metadiscursive nouns across soft and hard fields (per 1000 words)

	App Ling	Markt	Phil	EE	Med	Physics
Anaphoric						
Deter + N	17.7	17.8	20.9	13.2	3.2	6.8
Deter + be + N	0.0	0.0	0.5	0.1	0.0	0.0

Cataphoric						
N + compl	2.5	4.7	6.9	1.4	1.3	0.3
Deter + N	3.8	3.1	2.2	3.7	1.7	1.1
N + be + compl	1.3	0.1	1.2	0.1	2.6	0.1
Total	**25.4**	**25.7**	**31.8**	**18.5**	**8.8**	**8.3**

Unsurprisingly, we found more metadiscursive nouns in the soft fields, responding to the diversity of topics, less assured foundations of knowledge and fewer clear bases for accepting claims. Writers must step into their texts more often than scientists to offer discursive support for their claims (Becher & Trowler, 2001; Hyland, 2004, 2015). But interestingly in terms of cataphoric reference, writers in each of the soft disciplines except applied linguistics used more "N + post-nominal clause" structures than "determiner + N" patterns, while those in the hard sciences made the opposite choice. A closer look into cataphoric uses of the "determiner + N" construction in sciences reveals that it is primarily concerned with promoting the accompanying article, most prominently in electronic engineering which averages 3.7 instances per 1000 words.

> (21) *This* **paper** describes our work in creating a network simulation model framework for software defined radios that takes into account some of the unique behaviors and requirements of SDRs not previously seen in purely hardware devices. [Electronic engineering]

> (22) *This* **study** concludes by successfully identifying the best GM practice for this case industry, and it provides some important managerial implications. *This* **research** explores some future trends to make the study more reliable in changing real life scenarios. [Electronic engineering]

As we can see from these examples, this is possibly driven by the highly competitive nature of this field in establishing the novelty and newsworthiness of their claims, either rhetorically integrating this promotion with self-mention (21) or by calling repeated attention to what their study has contributed (22).

Another observation worth mentioning is the relatively frequent use of the "N + be + complement clause" construction in medical abstracts. As many as three fifths of medical abstracts employ this form to announce the purpose of the research, as here:

> (23) Our **aim** was to determine whether hepcidin is increased in EPP/XLP patients, resulting in decreased enteral iron absorption and IDA.
>
> [Medicine, purpose]

> (24) The primary **objective** of this study was to compare the bioavailability of paracetamol, phenylephrine hydrochoride and guaifenesin in a new oral syrup with an established oral reference product. [Medicine, purpose]

As we discussed above, this structure enables writers to foreground the purpose statement, with the metadiscursive noun signalling the content in the complement, highlighting the aim and value of their research and simultaneously formulating a cohesive flow of information.

7. Interactional dimension: stance and engagement

As regards the interactional function, metadiscursive nouns either seek to express the writer's stance or engage readers in the argument, but we can see from Table 5 that the vast majority of perform stance functions.

Table 5 Overall distribution of stance and engagement features in the interactional function

Interactional function	Total cases	% of cases
Stance	780	94.7
Engagement	44	5.3

Interestingly, we found that the 5.3% which express exophoric reference, addressing readers directly as engagement markers, most commonly occurs in the *background* move where it comprises 12% of all metadiscursive nouns. Here authors seek to situate their work in the interests of their community and anticipate possible resistance. In (25), the engineering authors seek to interest readers in their research by encouraging them to see the insufficiency of prior work. In (26) readers are brought into the argument and maneuvered to agreement by

recognizing an established assumption of philosophical thought. Such strategies help position the writer as a credible insider.

(25) Numerous studies have explored this strategy but there are significant gaps in the existing **literature**, particularly in environmental practices specific to India. [Electronic engineering, background]

(26) According to the intellectual **tradition**, moral virtue requires you always to be able to have an explicit, conscious grasp of the reasons why your action is right. [Philosophy, background]

In order to explore the stance options that writers make through these nouns we examined each instance manually to assign them the functional categories described in Table 6. This model suggests that metadiscursive nouns are used to express how academic writers mark ***entities***, describe ***attributes*** of entities and discuss the ***relations*** between entities.

Table 6 A functional classification of nouns in academic texts (Jiang & Hyland, 2016)

Entity	**description**	**examples**
object	concrete metatext	*article, paper, study*
event	events, processes, and evidential cases	*change, case, observation*
discourse	verbal propositions and speech acts	*argument, claim, conclusion*
cognition	cognitive beliefs and attitudes	*decision, idea, notion, aim*
Attribute	**description**	**examples**
quality	traits that are admired or criticised, valued or depreciated	*advantage, difficulty, failure*
manner	circumstances of actions and state of affairs	*time, method, way, extent*
status	epistemic, deontic and dynamic modality	*possibility, trend, choice, ability*
Relation	**description**	**examples**
cause-effect, difference, etc.	cause-effect, difference, relevance	*reason, result, difference*

Nouns which characterise **entities** do so by either conveying writers' judgement of texts, events, discourses or aspects of cognition. Nouns representing ***object*** refer to metatext, or a concrete piece of research, so that examples such as *report, paper* and *study* are typical. ***Event*** nouns refer to either occurrence of actions and processes or evidential cases, with examples such as *change, case, observation* and *finding* being frequently used. ***Discourse*** nouns describe verbal propositions and speech acts, such as *argument, claim* and *conclusion* while ***Cognition*** nouns concern beliefs, attitudes and elements of mental reasoning, such as *decision, idea, notion* and *aim.*

Nouns relating to **attributes** concern evaluations of the quality, status and formation of entities. Thus nouns pertaining to ***quality*** assess whether something is admired or criticised, valued or disparaged. Here assessments fall on a scale of plus or minus (e.g. good-bad and important-unimportant), typically involving nouns such as *advantage, difficulty* and *failure*. Nouns relating to ***manner***, in contrast, describe the circumstances and formation of actions and states of affairs. Nouns such as *time, method, way* and *extent* depict either their connection to place and time, the way in which they are carried out or the frequency with which they occur. Metadiscursive nouns which concern ***status*** express judgments of epistemic, deontic and dynamic modality. Epistemic modality concerns possibility and certainty such as *likelihood* and *truth*; deontic modality bears on obligation and necessity such as *need* and *obligation*; dynamic modality describes ability, opportunity and tendency such as *ability*, *potential* and *tendency*.

Finally, nouns encode how a writer understands the connection between the information in a proposition, conveying **relations** such as *reason, result* and *difference* (Jiang & Hyland, 2016).

The most common stance choices in our abstracts involve reference to *entities*, with *event* nouns, concerning actions, processes or states of affairs, the most frequent sub-category, comprising 25.5% of all metadiscursive nouns. Nouns therefore typically have a real-world focus, illustrating the predominance of empirical research and relying on nouns such as *case* and

evidence. Within the second main subcategory of nouns, concerning *attribute*s, writers most often take a stance towards the manner and circumstances in which actions and research subjects are discussed, amounting to 13.9% of all metadiscursive nouns. Table 7 summarises these figures and their distributions.

Table 7 Stance choice of metadiscursive nouns across rhetorical moves (per 1000 words)

	Total	**background**	**purpose**	**methods**	**results**	**conclusion**
Metadiscursive Nouns	**18.8**	**17.0**	**31.8**	**13.0**	**17.5**	**25.3**
Entity	**12.1**	**11.4**	**24.3**	**7.9**	**9.1**	**16.6**
object	3.1	0.4	8.1	1.4	1.0	4.0
event	4.8	3.9	8.7	3.9	4.6	7.2
discourse	1.3	2.9	1.6	0.4	1.2	2.3
cognition	3.0	4.2	5.9	2.2	2.3	3.1
Attribute	**4.6**	**4.1**	**6.2**	**4.3**	**5.1**	**4.7**
quality	1.1	1.2	2.1	1.4	0.9	1.3
status	0.8	1.4	1.0	0.7	1.1	1.5
manner	2.6	1.5	3.1	2.2	3.1	1.9
Relation	**2.1**	**1.5**	**1.3**	**0.8**	**3.3**	**4.0**

We can see from Table 7 that in order to convey the importance of their research, the authors make heavy use of metadiscursive nouns in the *purpose* move, amounting to 31.8 cases per 1000 words. We find considerable use of *object* nouns here, with *article*, *paper* and *study* predominating, which help frame the novelty and contribution of the research, as the two extracts (27) and (28) illustrate below.

(27) In *this* **paper** we study the stability of a phase-locked loop (PLL) in the presence of noise. [Electronic engineering, purpose]

(28) *This* **article** attempts to explain the value that we assign to the presence of friends at the time when life is ending. [Philosophy, purpose]

It is also interesting to find that *event* nouns, highlighting the evidential status of the study, are frequent in both *purpose* and *conclusion* moves. It is interesting to note the different emphasis given in each move, with writers typically seeking to use event nouns to set an agenda for the study in purpose moves (29, 30) and to reflect on the outcomes by either summarising material (31) or characterising the study (32) in concluding moves.

> (29) This paper presents an **attempt** to reduce the actuation voltage of capacitive RF-MEMS switch by introducing the concept of non-uniform serpentine flexure suspensions. [Electronic engineering, purpose]

> (30) Specifically, it represents an **attempt** to shed light on writers' internal process factors by examining the longitudinal development ... [Applied linguistics, purpose]

> (31) *These* **actions** directly translate into consumers' click-through intentions so that retailers should adjust their personalization strategies accordingly ... [Marketing, conclusion]

> (32) *These* **observations** herein show a clear path for multiscale design, from quantum to continuum mechanics, of solute strengthening in face-centred-cubic metal alloys. [Physics, conclusion]

In addition, there are also a larger number of metadiscursive nouns in the *purpose* move referring to *attribute*s, either to stress the research gap writers intend to fill (examples 33 and 34) or to underscore the contribution their study aims to make (35 and 36).

> (33) Using a sociological lens, this article focuses on the **complexities** of not celebrating a dominant collective consumption ritual by focusing on people who do not celebrate Christmas in America. [Marketing, purpose]

> (34) In this paper, we have examined *the* **problems** in single and parallel machine scheduling. [Electronic engineering, purpose]

> (35) I develop this view to add the **possibility** that political philosophers can try to correct a situation in which a particular value, though important, can come to be too highly emphasized. [Philosophy, purpose]

(36) we present cultural studies in marketing showing the **importance** of using neurophysiological tools in different cultures. [Marketing, purpose]

Relation nouns are employed more frequently in the final two moves of the abstract, specifying the connection between elements of the research findings. We can see this in the two examples below. In (37) the writer comments on the significance of the research by establishing an evaluative link between the findings and a real world issue. In (38) the physicist summarises an unexpected outcome and suggests a tentative reason for it.

(37) *This* **relationship** is relevant in milieus where consumers might take brand authenticity rather than quality perceptions to guide their brand evaluations. [Marketing, results]

(38) An anomaly was observed in the poling behavior of the strain in 〈001〉 oriented BNT-100xBT in the immediate vicinity of the MPB with $x = 0.065$, resulting in a giant small-signal piezoelectric coefficient d 33 of 4600 pm/V. *This* **effect** is hypothesized to be due to an irreversible phase change from rhombohedral polar nanoregions to tetragonal ferroelectric microdomains. [Physics, conclusion]

One disciplinary peculiarity we find in the corpus is the medical authors' choice of *object* nouns. Writers in other disciplines use *article*, *paper* and *study* interchangeably, but *study* is the *only* object noun used by medical researchers. Sala (2014, p. 216) argues that *article* represents a more "written and 'definitive' discussion of 'acquired' data", perhaps implying that the exclusive preference for *study* in medicine indicates a less definite research outcome and a more incomplete and continuing process. The trustworthiness of knowledge and information in medicine comes from the observation of a changing reality, either the capricious developments of a physical disorder or the unpredictable effect of a medical treatment on a disease (Vihla, 1999) and referring to it in a conclusive way violates an epistemological orientation of the field. The following extracts give some sense of this discursive effect:

(39) In *this* **study**, in the same cohort of patients with chest pain, we compared the value of IgM-uria to pro-inflammatory cytokines in predicting the occurrence of subsequent cardiovascular events. [Medicine, purpose]

(40) *This* **study** confirmed the validity of RBC-Y in the management of ID, but not in RDT, where the diagnostic power of RBC-Y as an index of cell hypochromia is limited owing to high MCV values. [Medicine, results]

(41) The aim of *this* **study** was to evaluate the extent to which the red cell parameters, RBC-Y and RET-Y, provided by Sysmex XE 2100, correlate with HYPO and CHr. [Medicine, purpose]

Another discipline worthy of mention for its variant use of metadiscourse nouns is philosophy. Overall, philosophers have a preference for *cognition* nouns with 25.2% of the total, but in the *background* move, they opt for *discourse* nouns more often. Here these nouns, average 33.3% of all the cases in this move against the *cognition* nouns which account for only 23.8%. The high frequency of cognition nouns in philosophers' abstracts is not hard to understand as their reasoning and modes of knowing rely heavily on beliefs, logic and mental reasoning, encoded in cognition nouns. However, in the *background* move, philosophers are required to set the scene for the reader by foregrounding current disputes and unresolved issues in the discipline in order to exhibit their competent grasp of relevant topics in the field. This involves the use of discourse nouns as here:

(42) Recent work on dispositions offers a new solution to the long-running **dispute** about whether explanations of intentional action are causal explanations. [Philosophy, background]

(43) Contemporary thinkers have attempted to fill the empirical gap in *this* conservative **argument** by appealing to evolutionary science. [Philosophy, background]

In sum, writers make frequent use of metadiscursive nouns in abstracts, both to assist readers processing of the necessarily compact information in this genre and to express their authorial

stance towards this information. Writers' efforts to create anaphoric linkage between segments of their discourse through these nouns, especially in the *purpose* and *conclusion* moves, help them to create a persuasive platform for readers. At the same time, writers employ metadiscursive nouns to take a position towards their propositional content, promoting the value and contribution of their research. As we have seen, the kinds of interaction adopted vary across different communicative moves and across different disciplines, responding to both the purposes of the genre and the epistemological and social preferences of the fields.

8. Conclusion

The abstract is an important academic genre crucial to the construction of knowledge by allowing readers to filter the flow of information available and enabling writers to endorse their accompanying article. With abstracts free to readers online and sent to solicit potential reviewers, the genre has significant value in promoting research and authors, so writers must hook the reader at the outset. The restricted textual space available, however, makes this a demanding rhetorical challenge and one which the versatility and functional importance of metadiscursive nouns helps writers to meet.

In many collaborative projects in the sciences, the writing of the abstract is often delegated to the least experienced member of the team, namely a graduate student (Feak, personal communication), yet novice writers find this a notoriously challenging genre (Hyland & Tse, 2005; Swales & Feak, 2009). Two of the main problems they face concern the construction of cohesive and coherent information and the projection of a credible disciplinary voice (Cao & Xiao, 2013; Hyland & Tse, 2005; Ventola, 1994).

Given the problems students face, we see some value in drawing on the analysis presented here for instructional purposes. In particular, the combination of move analysis and the rhetorical functions of these nouns might usefully contribute to EAP courses for postgraduate and professional academic writing. In these contexts we see it as crucial to sensitize students,

through various grammar tasks and consciousness raising activities, to the flow of anaphoric and cataphoric use and the distribution of grammatical patterns of these nouns across different moves. For example, writers would benefit from the knowledge that, when creating cataphoric textual cohesion, the *purpose* move generally employs "N + be + complement clause" in contrast to the "determiner + N" pattern which is frequently used in *conclusion* moves. Similarly, when considering interactional goals, the importance of different stance and engagement choices across moves should be emphasized in classroom activities. Text replacement and gap filling tasks can be useful here. Finally, having students work in pairs or in groups with peers from another discipline can be a good strategy to encourage them to see the disciplinary variations which occur in the interactive and interactional use of these nouns.

Overall, we hope to have shown that what we have called *metadiscursive nouns* are an important resource for writers to enhance cohesion and present a perspective on their work. They help to frame, scaffold, and present arguments as a coherently managed and organised arrangement, reflecting writers' awareness of the discursive conventions of different rhetorical moves and in consideration of the discoursal expectations and processing needs of a disciplinary audience. We cannot accept, therefore, Sword's (2012, 2015) recent argument that these are "zombie nouns" which lack activeness and personal intimacy, and on the contrary we believe they should figure in the advanced writing for publication courses which are now a feature of graduate education around the world.

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Appendix 1 Journal list

(1) Applied Linguistics

Applied Linguistics
TESOL Quarterly
Second Language Research
System
English for Specific Purposes
Journal of English for Academic Purposes
Journal of Second Language Writing
Journal of Pragmatics
Written Communication
International Journal of Applied Linguistics

(2) Marketing

Journal of Marketing Management
International Journal of Research in Marketing
Journal of Marketing Research
Journal of Marketing
Journal of the Academy of Marketing Science
Journal of Marketing Communication
Journal of International Consumer Marketing
Journal of Consumer Research
Journal of Retailing
Marketing Science

(3) Philosophy

Mind
International Journal of Philosophical Studies
Analysis
The Philosophical Quarterly
Philosophy
Erkenntnis
Inquiry
Political Theory
Ethics
Philosophy and Public Affairs

(4) Electronic Engineering

International Journal of Microwave and Millimeter-Wave CAE
Microsystem Technologies
IEEE Transactions on Microwave Theory and Techniques
Journal of Microelectromechanical Systems
Solid-state Electronics
Microelectronics Journal
Analog Integrated Circuits and Signal Processing
Journal of Manufacturing Science and Engineering
International Journal of Production Research
International Journal of Industrial Engineering

(5) Medicine

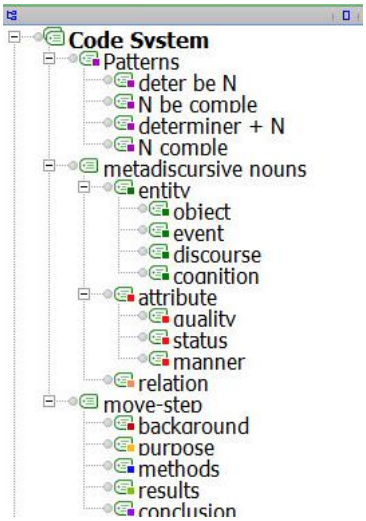
Scandinavian Journal of Clinical & Laboratory Investigation
Nucleic Acid Therapeutics
Nature Medicine
Molecular Medicine
Medical Hypotheses
Journal of Investigative Medicine
Journal of Experimental Medicine
Vaccine
European Journal of Clinical Investigation
Journal of International Medical Research

(6) Physics

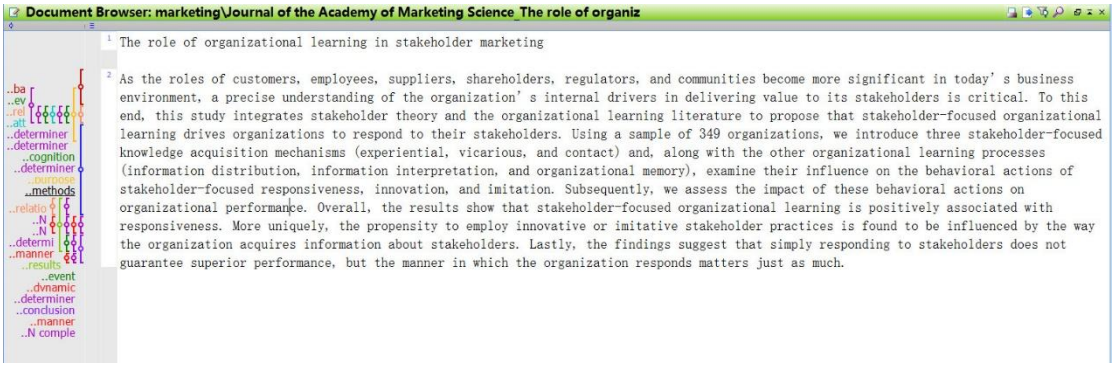
Journal of Magnetism and Magnetic Materials
Astroparticle Physics
Journal of Computational Physics
Journal of Mathematical Physics
Journal of Physics A-mathematical and Theoretical Contemporary Physics
Journal of Material Science
Advances in Physics
Physical Review B
American Journal of Physics

Appendix 2 Coding scheme and a coded sample

1. The full coding scheme



2. A sample coded text



***Biography**

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