STANCE MARKERS IN FORESTRY RESEARCH ARTICLES: INDICATORS OF AUTHORITATIVE VOICE

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Abstract

Stance markers, serving as the primary discursive category of interactional metadiscourse, function as a reliable measure for evaluating how authors of research articles authoritatively foreground their research within disciplinary communities. Stance research primarily focuses on how authors or speakers adjust the certainty level of their assertions, both epistemically and emotionally. This study examined the occurrences of stance markers in each rhetorical move within the Introduction, Methods, Results and Discussion sections of forestry research articles. The corpus comprised 40 research articles randomly selected from five ISI journals in the forestry discipline. This study utilized Hyland's (2005) model of academic interactions and Kanoksilapatham's (2005) framework as analytical tools for identifying stance markers and the rhetorical structure of forestry research articles. The findings revealed differences in the distribution of these markers across the different sections and constituent rhetorical moves within the research articles. Overall, hedges and self-mentions emerged as the most prevalent stance markers in this study. Across sections, attitude markers and hedges predominated in the Introductions, while self-mentions and hedges were pervasively applied in the Methods sections. Boosters and attitude markers were common in the Results, and boosters along with self-mentions were notable in the Discussions. Finally, stance markers appear to play a fundamental role in shaping distinct argumentations across discourse communities, while effectively reflecting disciplinary voices.

Keywords

metadiscourse, stance markers, research article, forestry

1 Introduction

Genre analysis of research articles has experienced a surging interest over the past three decades. Swales' work (1990, 2004) is widely regarded as a cornerstone in English for Specific Purposes (ESP) genre analysis, particularly concerning research articles. This has led to the fusion of genre analysis with corpus linguistics studies. Incorporating the interpersonality concept in genre analysis can provide valuable insights into how writers establish their communicative goals and interact with their audience within research articles (Hyland & Tse 2004). This approach highlights the integral relationship between language, genre conventions, and interpersonal communication in academic writing. By adopting

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a dialogic approach to writing and projecting their stance, writers acknowledge the importance of interaction with readers, their needs, perspectives, and expectations while reinforcing solidarity between the writers and the audience (Soylu et al. 2023). The adept application of interactional metadiscourse features, stance markers and engagement markers facilitates reader involvement with the text (Mei et al. 2020). By strategically deploying such elements, writers create a sense of interaction and dialogue within the text, encouraging readers to actively participate in the act of meaning making. Stance markers, which include hedges, boosters, attitude markers, and self-mentions, are established as the fundamental elements of interactional metadiscourse features. Building on Hyland's (2005) framework, stance encompasses three essential components of *evidentiality* (hedges and boosters), *affect* (attitude markers), and *presence* (self-mentions).

Recognizing the pivotal role of appraisal mechanisms in academic writing, mastering the strategic use of persuasion devices and stance markers within each rhetorical move and throughout the research article has emerged as the primary challenge for authors. This proficiency considerably increases the likelihood of publication in reputable English-language journals. The credibility of a research paper depends not only on its substantive content but also on the writer's ability to integrate it into a coherent communicative framework through employment of a balanced proportion of stance markers in each rhetorical move to reinforce the persuasive effect of each communicative unit (Nasirizadeh et al. 2022).

Academic research writing constitutes a distinct genre of argumentation grounded in the presentation of truth, both empirical and non-empirical evidence, impeccable logic, and cognizant rhetoric. Through stance markers, authors interpret data and persuade readers of the worthiness of their argumentations (Jiang & Hyland 2015). Stance markers are regarded as indicators of authoritative voice and a primary criterion for gauging the certainty level of writers' expressed attitudes toward the propositional content in a text (Hyland 2012). Stance markers are widely recognized as a fundamental component of academic persuasions. Stance can be defined with respect to both physical and mental aspects. Fleming (1967) uses *attitude* interchangeably as a synonym for *persuasion*. Originally associated with physical features such as body posture and accent, *attitude* from the Latin word *habitus* represents how social culture and personal history shape the body and mind (Fleming 1967, as quoted in O'Keefe 2015). Biber (2006), however, states that affective evaluations are uncommon in academic texts, and they are typically expressed implicitly rather than explicitly in academic texts.

Stance markers aid research article writers in achieving their communicative goals, both rationally and affectively, by adjusting the commitment and certainty level of their statements. Issues in projection of an opposite authorial stance has

frequently resulted in underestimating the writers' texts and research potentials (Bahrami et al. 2018). Many submitted papers are rejected not because of obvious syntactic or lexical errors, but rather due to issues in commitment and argumentation, especially concerning the use of hedges and boosters (see Flowerdew 2001, Englander 2006). Hedges, while revealing probability and a degree of uncertainty or academic modesty, potentially allow for increased precision. Hedges prompt researchers to adopt less personal, less biased, and more objective, data-driven, and metrics-driven judgments (Hyland 2005). Boosters convey conviction, assertion, presentation of non-provisional claims, and emphasis on information (Hyland 1998).

The reduced application of boosters and attitude markers indicates a shift from commitments expressed as personal beliefs to more objective, data-supported assurances (Hyland & Jiang 2018). However, the increased use of boosters in research papers has been linked to hyperbolic and promotional language to emphasize certainty, contribution, novelty, and potential, particularly regarding research methods, outcomes, and the significance of a study (Hyland & Jiang 2021). Propelled by metrics-driven career incentives, scholars are under continual pressure to capture the attention and approval of reviewers, editors, readers, funders, and promotion boards. This often entails rhetorically promoting their work through hyping language to maximize visibility (Hyland 2023).

As to self-mentions, Hyland and Jiang (2017) argue that, traditionally, the absence of first-person pronouns was considered a hallmark of positivist impersonality. Positivism or empiricism has traditionally emphasized the persuasive authority of impersonality through passive voice structures, to enhance the credibility of the writer and obtain credibility from readers. Initially inspired to see if there is evidence for the often-heard claim that academic writing has become more impersonal in recent years, Hyland and Jiang discovered that the hard sciences compared to the social sciences have experienced a remarkable increase in the application of first-person pronouns as the main marker of informality in academic writing. While some researchers have examined the realizations of stance markers in research articles across the various soft and hard science disciplines (e.g. Hyland & Jiang 2018, Azar et al. 2022), studies specifically focusing on the identification of such markers across rhetorical moves of research articles, especially in forestry, are scarce. Indeed, this field remains largely unexplored in terms of its rhetorical structure and metadiscoursal features. The examination of forestry as a hard science is principally motivated by the practical need to analyze research articles within the quantitative paradigm. Such research papers are often grounded in positivist-empiricist assumptions,

which mainly serve as a cornerstone for academic and scientific judgments (Ryan 2006). This study aims to investigate the following questions:

1. How are stance markers distributed in the Introduction, Methods, Results, and Discussion sections of forestry research articles?
2. How do forestry authors apply stance markers in each move of forestry research articles to pursue their persuasive goals?

To address these questions, Hyland's (2005) interactional model of metadiscourse and Kanoksilapatham's (2005) framework were applied to explore the distribution of stance markers in each rhetorical move of the sections of forestry research articles.

2 Theoretical framework

2.1 Hyland's (2005) interactional model of metadiscourse

Vande-Kopple's (1985) classification of metadiscourse is divided into two subcategories: textual and interpersonal metadiscourse. Using Vande-Kopple's (1985) classification system of metadiscourse as a point of reference, Crismore et al. (1993: 17) developed "a revised classification system for metadiscourse categories", similarly divided into two domains of textual and interpersonal, incorporating ethical appeals which cut across both textual and interpersonal domains. Focused particularly on the academic interactions, Hyland (2005) proposed a taxonomy known as the interactional model of metadiscourse that summarizes the whole spectrum of interactional metadiscourse with two types of interactions: stance markers and engagement markers. Stance markers (hedges, boosters, attitude markers, and self-mentions) define how speakers or writers position themselves in relation to a statement or utterance. Conversely, engagement markers (reader pronouns, directives, questions to the reader, shared knowledge, and personal asides) characterize writers' adjustment and connection with their audience. Hedges reflect writers' attempts to acknowledge alternative voices, enabling them to adjust their commitment levels to a proposition by anticipating potential refutations from readers and to present less assertive certainties. Boosters, however, are linguistic tools that authors use to promote their work and enhance their argumentations by emphasizing the epistemic commitment and assertive certainty of claims. Attitude markers express writers' emotional rather than epistemic stance toward a proposition, reflecting their perspective on agreement, surprise, value, etc. Self-mentions signify the overt presence of authors in a text through linguistic tools such as *I*, *my*, *we*, *us*, *the author*, *the writer*, etc. Writers utilize these tools to establish an accomplished academic identity, claim authority for their argumentations, marketize their study,

and establish themselves as active participants in the research process (Hyland 2005). While both categories of interactional metadiscourse are important, this study specifically focuses on stance markers. Table 1 provides the list of stance markers based on Hyland's (2005) interactional model of metadiscourse.

Stance markers	Examples
Hedges	about, almost, apparent, apparently, appear, appeared, appears, approximately, argue, argued, argues, around, assume, assumed, broadly, certain amount, certain extent, certain level, claim, claimed, claims, could, couldn't, doubt, doubtful, estimate, estimated, fairly, feel, feels, felt, frequently, from my perspective, from our , from this perspective, generally, guess, indicate, indicated, indicates, in general, in most cases, in most instances, in my opinion, in my view, in this view, in our opinion, in our view, likely, mainly, may, maybe, might, mostly, often, on the whole, ought, perhaps, plausible, plausibly, possible, postulate, postulated, postulates, presumable, presumably, probable, probably, quite, rather, relatively, roughly, seems, should, sometimes, somewhat, suggest, suggested, suggests, suppose, supposed, supposes, suspect, suspects, tend to, tended to, tends to, to my knowledge, typical, typically, uncertain, uncertainly, unclear, unlikely, usually, would, wouldn't
Boosters	actually, always, believe, believed, believes, beyond doubt, certain, certainly, clear, clearly, conclusively, decidedly, definite, definitely, demonstrate, demonstrated, demonstrates, doubtless, establish, established, evidently, find, finds, found, in fact, incontestable, incontestably, incontrovertible, incontrovertibly, indeed, indisputable, indisputably, know, known, must, never, no doubt, obvious, of course, prove, proved, proves, realize, realized, realizes, really, show, showed, shown, shows, sure, surely, think, thinks, thought, truly, true, undeniable, undeniably, undisputedly, undoubtedly, without doubt
Attitude markers	agree, agrees, agreed, amazed, amazing, amazingly, appropriate, appropriately, astonished, astonishingly, correctly, curious, curiously, desirable, desirably, disappointed, disappointing, disappointingly, disagree, disagreed, disagrees, dramatic, dramatically, essential, essentially, even, expected, expectedly, fortunate, fortunately, hopeful, hopefully, important, importantly, inappropriate, inappropriately, interesting, interestingly, prefer, preferable, preferably, preferred, remarkable, remarkably, shocked, shocking, shockingly, striking, strikingly, surprised, surprisingly, unbelievable, unbelievably, understandably, unexpected, unexpectedly, unfortunate, unfortunately, unusual, unusually, usual
Self-mentions	I, we, me, my, our, mine, us, the author, the author's, the writer, the writer's
Engagement markers	consider/note that/you can see that

Table 1: Interactional model of metadiscourse (Hyland 2005)

2.2 Kanoksilapatham's (2005) framework

This study utilized Kanoksilapatham's (2005) framework to investigate the rhetorical structure of forestry research articles. To our knowledge, this framework, originally developed for the analysis of biochemistry research articles, is the most comprehensive tool available for examining the rhetorical structure of research articles in forestry, a hard science discipline. Kanoksilapatham (2005) asserts that this framework is applicable across the various hard sciences, encompassing basic hard sciences, natural sciences, health or clinical sciences, and the applied- hard sciences.

Introduction section
Move 1: Announcing the importance of the field
Move 2: Preparing for the present study
Move 3: Introducing the present study
Methods section
Move 4: Describing materials
Move 5: Describing experimental procedures
Move 6: Detailing equipment
Move 7: Presenting equations, models, algorithms and their background
Move 8: Describing statistical procedures
Results section
Move 9: Stating procedures
Move 10: Justifying procedures or methodology
Move 11: Stating results
Move 12: Stating comments on results
Discussion section
Move 13: Contextualizing the study
Move 14: Consolidating results
Move 15: Stating limitations of the study
Move 16: Suggestions for further research

Table 2: Kanoksilapatham's (2005) framework

3 Methodology

3.1 The corpus

The corpus of this study consists of 40 data-driven empirical research articles randomly selected from five ISI forestry journals (2015-2016), amounting to a total of 36,545 words. These research papers follow the IMRD structure (Introduction, Methods, Results, Discussion). Swales (2004) notes that this structure is not applicable to theoretical and review papers. Kwan (2017)

suggests that the IMRD structure is widely known for its application in extended contexts, for both pedagogical and research purposes. The selected articles were extracted from high impact factor journals in forestry. The research papers were analyzed to identify stance markers across the rhetorical moves of the research articles, employing Hyland's (2005) interactional model of metadiscourse and Kanoksilapatham's (2005) framework.

3.2 Data analysis

The present study used AntConc 3.4.0W (Anthony 2013), a freeware concordance program, to identify stance markers across each rhetorical move of forestry research articles. A concordance is a compilation of target words extracted from a text, illustrating their context. We derived the word list from Hyland's (2005) taxonomy of interactional metadiscourse. Applying Kanoksilapatham's (2005) framework, we meticulously reviewed the research articles to manually codify the rhetorical moves, recording the frequency of occurrences of each move and the respective stance markers. In this study, the primary unit for analysis of moves was typically the sentence. However, in cases where clauses incorporating a sentence served distinct functions, each was designated as a separate move (e.g. Pho 2013). We applied Kanoksilapatham's (2005) framework to identify the rhetorical moves, each coded as 0 or 1 within each paragraph to record whether a communicative unit is absent or present. For the identification of stance markers, we followed Hyland's (2005) taxonomy of interactional metadiscourse. Indeed, we did not merely rely on the mechanical procedure of detecting the indexed keywords. Instead, we thoroughly analyzed each instance, taking into account the word context to discern functional meaning rather than propositional meaning. According to Hyland (2005: 40), "propositional meaning" refers to the textual material concerning the world outside the text, often juxtaposed with "metadiscourse meaning" or "functional meaning" which reflects the writers' consideration of their readers. Respectively, inter-rater reliability was calculated through Cohen's kappa value and percentage agreement, applying the formula $A / (A + D) \times 100$, where A represents the number of agreements and D represents the number of disagreements. To assess inter-rater reliability, two PhD holders in the field of English Language with expertise in discourse studies were invited to independently code ten research articles (25% of the entire corpus). This aimed to measure the level of agreement between our coding and theirs. We conducted a two-hour training session for the coders to familiarize them with the coding system and to teach them how to use the AntConc 3.4.0W software for identifying stance markers. Following this training, we collaboratively reviewed the text to address any discrepancies between our coding and the coders'

designations. Disagreements were resolved through discussions, negotiations, and clarification of the criteria for coding rhetorical moves and identifying stance markers. The coders discussed any problems or ambiguities that emerged in the coding process. The process was repeated multiple times using various randomly selected samples until all discrepancies were unanimously resolved and a substantial level of agreement was reached. The achieved agreement value was 98.5 per cent.

4 Results and discussions

The following section provides information on the findings from the analysis of stance markers in each section of the forestry research articles.

4.1 Stance markers in the Introduction sections

The frequency percentages of stance markers in each rhetorical move within the Introductions of forestry research articles are displayed in Table 3.

Move	Hedges			Boosters			Attitude markers			Self-mentions		
	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words
M 1	169	67.3	4.62	69	75.0	1.88	56	75.4	1.53	17	16.5	0.46
M 2	55	21.9	1.50	12	13.0	0.32	14	17.9	0.38	15	14.5	0.41
M 3	27	10.7	0.73	11	11.9	0.30	3	6.6	0.08	71	68.9	1.94
Total	251	16.2	6.86	92	11.1	2.51	73	26.8	1.76	103	11.1	2.81

Table 3: Distribution of stance markers in the Introduction sections
(Note: RN stands for Raw Number in Tables 3-6 and 8)

According to the findings from the present study, attitude markers (26.8%) were documented as the dominant stance markers with hedges (16.2%) being the second most frequently documented feature in the Introductions. It can be argued that forestry writers often emphasize their affective attitude rather than epistemic attitude to underscore the significance of their topic, establish the gap, and stabilize their study objectives. Forestry writers showed a tendency to employ fewer boosters and rather more hedges in Introductions, possibly to avoid absolute commitment, particularly when justifying the novelty of their current research (M2), preferring statements that are less personal and more objective in tone. However, in mechanical and electrical engineering research articles, Estaji and Vafaeimehr (2015) found that boosters prevailed over hedges,

indicating a more personal and less objective stance in this section. In Move 1, *Announcing the importance of the field*, boosters (75%) outnumbered hedges (67%). It seems that forestry writers prefer to upgrade rather than tone down their voice when highlighting the significance of their topic through referring to the shared literature. A probable explanation is that forestry writers tend to express conviction and assert their propositions via a more direct tone when calming significance of their study. In line with Khedri and Kristi's (2018) study on chemistry research articles, authors had a tendency to employ emphatic language to anchor their study in previous research, leaving little room for alternative interpretations on the readers' part. Hedges outnumbered boosters in Move 2, *Preparing for the present study*, which involves presenting the study gap. This suggests that forestry authors prefer to project a more cautious and less subjective or personal stance to convince readers of justification of their study gap, valuing alternative voices and viewpoints. The present findings are consistent with Salager-Meyer's (1994) study in that hedges were notably applied in Move 2 of medical research articles. However, Martin and Leon Perez (2014) found that writers in health sciences and political sciences often emphasized their contribution in Move 2 Introductions. In Move 3, I*ntroducing the present study*, higher levels of boosters (11.9%) than hedges (10.7%) were employed. One reason for this tendency could be that scholars in this field feel comparatively confident in outlining their research objectives by presenting hypotheses, stating procedures, and highlighting the value of their study.

(1) *Placement of trees in front of buildings* ***could*** *reduce the unpleasantness of the environment, especially when located in front of taller buildings.* (R) [M1]

(2) ***Indeed****, in a test conducted on several ecotypes of Agrostis stolonifera, it was* ***found*** *that these two factors were independent* (Ashraf et al., 1986). [M2]
(Note: R means 'Reference', M1 means Move 1, and M2 means Move 2)

In the above excerpts, *could* in Example (1) represents hedges, conveying metadiscoursal meaning and therefore is considered as an instance of stance markers. In Example (2), *indeed* and *found*, functionally analyzed, are considered as boosters, serving to amplify the message conveyed in the text.

Regarding attitude markers, the majority were documented in Move 1 (74.4%), indicating that forestry authors tend to express their affective stance when establishing the importance of their study. They frequently apply exuberant attitudes in anchoring their study in the field, providing general information, and referring to past studies. Move 3 devoted itself to the lowest percentage of attitude markers (6.6%), aiming to present the study objectives in a more rational

rather than emotional manner. This is nearly consistent with research conducted by Khedri and Kristi (2018) on soft-science and hard-science research articles. In their study, attitude markers were found only in Moves 1 and 2, with a higher percentage observed in Move 1.

(3) *It is **interesting** to study the plant species distribution patterns along complex environmental gradients mainly for two reasons.* [M2]

In Example (3), *interesting* is an instance of attitude markers, reflecting the authors' affective stance towards the propositional meaning covered.

Regarding self-mentions, the highest percentage was identified in Move 3 (68.9%), suggesting that forestry authors tend to explicitly emphasize their original contribution to the field of research through linguistic expressions such as *we*, *our*, and *us* in presenting their study objectives. The present findings align with those from Swales' (1990) study in that among the three Introduction moves, Move 1 and Move 2 displayed a relatively impersonal nature in contrast to Move 3, which showed a more personal nature. In the current study, the move with the lowest level of self-mentions was Move 2, indicating the impersonal nature of argumentations regarding the justification of gaps in forestry.

(4) *In **our** analysis, **we** aim at the following questions.* [M3]

Example (4) substantiates two cases of self-mentions, a plural inclusive pronoun *our* and *we*. In this study, all instances of self-mentions were exclusively plural, and no singular pronouns were found. This pattern could reflect the pluralistic nature of this discipline, similar to the hard sciences, where research is predominantly conducted by teams of researchers. Moreover, it could be suggested that forestry authors tend to marketize their research in a more personal manner, not merely relying on passive structures.

4.2 Stance markers in the Methods sections

Table 4 present the frequency and distribution of stance markers in the Methods sections.

Move	Hedges			Boosters			Attitude markers			Self-mentions		
	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words
M 4	67	12.4	1.04	22	17.1	0.34	9	18.1	0.14	37	9.2	0.57
M 5	194	36.5	3.03	47	42.9	0.73	17	29.09	0.26	141	35.3	22.05
M 6	9	1.0	0.14	1	0.78	0.01	0	0	0	7	1.7	0.10
M 7	137	28.0	2.14	36	28.1	0.56	22	25.4	0.34	84	21.0	1.31
M 8	84	21.8	1.31	22	17.1	0.34	15	25.4	0.23	130	32.5	2.03
Total	491	31.8	7.68	128	15.5	1.68	63	23.1	0.86	399	43.2	6.24

Table 4: Distribution of stance markers in the Methods sections

Exploring the Methods sections, the analyzed data revealed that self-mentions (43.2%), specifically plural pronouns *we*, *our*, and *us*, were the dominant stance markers in this section.

Indeed, scholars in this field exhibited a tendency towards projecting a pluralistic research identity and moving away from old archetypes of impersonality by reducing application of passive structures and claiming their contribution in this section. The second most highly employed stance markers, overall, were hedges (31.8%) which outnumbered boosters (15.5%). Analyzing each move distinctly, Move 5, *Describing experimental procedures*, the pivotal move in this section, was reported to include the highest percentage of boosters (42.9%) compared to hedges (36.5%). The analysis revealed that forestry researchers appear to be assertive and confident in presenting their arguments regarding the experimental procedures applied in their study. Having extracted the study corpus from data-driven empirical articles, methods play a pivotal role in research articles and are expected to be presented in a confident, hyperbolic manner rather than tentatively, to emphasize and marketize the contribution of the employed methods. The lowest percentage of boosters was documented in Move 6, *Detailing equipment* (0.78%), compared to hedges (1.06%), indicating that forestry authors prefer to be more cautious and less assertive in detailing the employed equipment in their study. Move 8, *Describing statistical procedures*, included the highest proportion of hedges (21.8%), compared to boosters (17.1%), indicating that forestry authors prefer to report the applied statistical procedures cautiously, leaving room for alternative options. Since a problem can be addressed through various approaches, a level of modesty in employing the statistical procedures seems rational in forestry as an applied hard science.

(5) *...which are usually **estimated** with a maximum likelihood procedure.* (R) [M7]

(6) *...also distinguished the zones where there were **clear** signs of (repeated) tractor movement.* [M5]

In the abovementioned excerpts, Example (5) represents hedges, while Example (6) represents boosters, both conveying functional or metadiscoursal meaning.

Regarding attitude markers, as displayed in Table 4, the highest percentage of such features was identified in Move 5 (29.09%). This suggests that forestry researchers are more inclined to express their attitude and knowledge ethics in the description of experimental procedures. In other words, they prefer to emphasize information on the employed methods in a more personal and less objective voice. The least number of attitude markers was employed in Move 4, *Describing materials* (9%). A fall in attitude markers or affect indicates more objective and less personal stance (Hyland & Jiang 2018).

(7) *...where the population was **expected** to increase in 2050 was set to the same value.* [M7]

In Example (7), *expected* is considered an example of a stance marker with the functional meaning of 'likely to happen'.

As regards self-mentions, in all the Methods moves, plural inclusive pronouns *we*, *us* and *our* were predominant. The highest percentage of self-mentions was indexed in Move 5 (35.3%). This record indicates the importance of authority on the part of forestry writers to claim their position in presenting the experimental procedures. By applying self-mention pronouns, forestry writers tended to further promote their contribution as researchers. Although personal pronouns that help writers describe their methodology and procedures may seem unlikely tools for self-promotion, *I* and *we* can stress the writers' procedural innovation and highlight how they are rigorous in their quest for sound data (Kuo 1999). The minimum number of self-mentions was realized in Move 6 (1.75%). The low frequency of self-mentions in this move indicates its impersonal nature.

(8) *To test **our** hypotheses, species were chosen based on the species' abundance along the typical local topographic gradient found at the EEST.* (R) [M4]

In Example (8), *our* is an instance of self-mentions, highlighting the authors' presence and epistemic stance in this sentence.

4.3 Stance markers in the Results sections

Table 5 demonstrates the frequency and distribution of stance markers in the Results sections.

Move	Hedges			Boosters			Attitude markers			Self-mentions		
	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words
M 9	67	9.3	0.55	9	4.7	0.24	2	6.4	0.05	9	16.3	0.24
M 10	194	1.8	0.11	4	2.1	0.11	1	3.2	0.02	5	9.0	0.13
M 11	9	45.7	2.71	144	75.7	3.99	15	48.0	0.41	32	58.1	0.88
M 12	137	42.9	2.55	33	17.3	0.91	13	41.9	0.05	9	16.3	0.24
Total	214	13.8	5.93	190	23.1	5.27	31	11.3	0.86	55	5.9	1.52

Table 5: Distribution of stance markers in the Results sections

In the Results sections, generally, the most prototypical stance markers were boosters (23.1%). This can indicate the significance of reporting empirical data in a more assertive, confident manner in this field, a hard science. As reported, Move 11, *Stating results*, has the highest frequency of boosters (75.7%), compared to hedges (45.7%). It appears that forestry scholars prefer to uphold commitment in presenting their findings. This pattern could be attributed to the nature of forestry as a hard science, emphasizing the tendency to accurately report data-driven findings from experiments. Emphasizing the importance of reporting findings from empirical studies precisely, Boginskaya (2022) points out that since engineering writers deal with numerical data, they are more inclined to create a more precise depiction in their writings. However, in Move 12, *Stating comments on results*, boosters occurred at a notably lower level (17.3%) than hedges (42.9%), suggesting that research writers in this field have a tendency to comment on their findings in a more conservative, less hyperbolic manner by applying more softeners. Finally, Move 9, *Stating procedures*, incorporated the lowest hits of both hedges (0.11%) and boosters (2.1%), with the latter dominating. Move 9 rephrases the research objectives, hypotheses of the study and experimental methodology. The highest percentage of boosters in this move indicates that forestry authors tend to refer to the applied methodology and procedures in their study in a less objective, more personal and assertive manner.

(9) *Therefore, the difference between two imagery sources seemed to be* ***about*** *4.6% in tree canopy cover estimates.* [M11]

(10) *While inter-specific variation was **found** to explain variance of recovery, resilience and relative resilience in 2000 as well as of resistance and resilience 2007.* [M12]

In Example (9) *about* has a functional meaning and is considered as an instance of hedges, meaning 'approximately'. In Example (10), *found* is considered a booster, having the metadiscoursal meaning of 'proved'.

In this study, the frequency of attitude markers in the Results sections was also recorded. Attitude markers peaked in Move 11 (48%) that details results, suggesting that forestry scholars tend to report their findings while they make use of expressions conveying expectedness and knowledge deontics. This finding could be due to the nature of the study, as quantitative empirical studies report on data from experiments which is supposed to comment on the expectedness of the results through attitude (Hu & Cao 2015). The lowest percentage of attitude markers was documented in Move 10, *Justifying procedures or methodology* (1.3%). This move justifies the employed methodology in the study, ensuring readers of the procedural validity. The low application of attitude markers in this move suggests that scholars in this field typically refer to the background of the employed methods in an uninvolving, less personal and more objective manner. Example 11 represents a case of attitude markers.

(11) *The figure also shows that the relationship was **remarkably** similar for all of the five years.* [M11]

Concerning self-mentions, all the indexed cases were plural inclusive pronouns *we*, *our*, and *us* in this section, peaking in Move 11 (58.1%). The highest number of self-mentions in this move indicates that forestry writers seek highlighting their authorial presence in reporting the results. Hyland (2005) contends that the existence or nonexistence of explicit authorial reference is usually a writer's conscious choice as to whether to adopt a personal stance and an authorial persona in the research. The lowest percentage of self-mentions was realized in Move 10 (9.09%). This move unfolds the rationale behind the applied method in the study through evaluation of the positive results previously obtained. Indeed, forestry authors scarcely used a self-promotional pronoun, adopting an impersonal stance when commenting on the applicability of their methods by referring to previous studies.

(12) *As **we** discussed in the previous section, Tsmax was reduced around the urban area in CTL.* [M11]

In Example (12), *we* reflects a case of self-mentions, establishing the author's contribution and epistemic stance in the research conducted.

4.4 Stance markers in the Discussion sections

Table 6 presents information on the frequency and distribution of stance markers in the Discussion sections of forestry research articles.

Move	Hedges			Boosters			Attitude markers			Self-mentions		
	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words	RN	%	Freq per 1,000 words
M 13	38	6.4	0.63	14	4.3	0.23	9	8.5	0.15	15	4.1	0.25
M 14	488	83.4	8.19	377	89.0	6.32	86	81.0	1.44	301	82.4	5.05
M 15	45	7.6	0.75	20	5.9	0.33	7	6.6	0.11	39	10.6	0.65
M 16	14	2.3	0.23	1	0.39	0.01	3	2.8	0.05	10	2.7	0.16
Total	585	37.9	9.82	412	50.0	6.91	105	38.0	1.99	365	39.5	6.12

Table 6: Distribution of stance markers in the Discussion sections

In the Discussion sections, overall, boosters (50.1%) were found to dominate hedges (37.9%). Forestry writers, as applied scientists, seem to be more inclined to constrain the diversity of opinions, projecting less objective and more personal stance when marking their involvement with findings interpretations and evaluations. The revealed pattern in Discussions contrasts with Introductions, where hedges dominated. Swales (1990) posits that Introductions and Discussions hold a mirroring rhetorical pattern to each other, with the former unfolding from general to specific information and the latter moving from specific to general information. It can be suggested that forestry writers are more cautious and less personal in Introductions while they tend to argue in a less objective and more personal manner in Discussions to establish their arguments. Similarly, Ghahremani and Biria (2017) found that medical science writers applied more boosters in the Discussion section of their papers. Interestingly, the move incorporating both hedges and boosters densely is Move 14, *Consolidating results*, which is considered by many as the core move in this section. Nevertheless, boosters (89%) dominated hedges (83.1%) in this move. Move 14, which is pivotal in Discussions, unifies findings through recounting the methodology, presenting particular findings, pointing to literature, referring to differences in findings, voicing claims or generalizations, and mentioning the value of the research. It appears that forestry authors feel confident in interpreting their findings by applying a high level of boosters to compare, contrast, and emphasize their findings, using a hyperbolic voice to marketize and foreground

their arguments. As for Move 16, *Suggestions for further research*, it included the least number of hedges and boosters, with the former (2.3%) dominating the latter (0.39%). This pattern suggests that scholars in this field prefer to be more conservative and cautious than straightforward and assertive in offering suggestions for further research.

(13) *…and the **possible** effects of other environmental factors should also be taken into consideration.* [M16]

(14) *Across sites, Scots pine is **known** to adjust its hydraulic system to the specific moisture conditions.* [M14]

In Example (13), *possible* is considered a stance marker, meaning 'likely' or 'probable'. In Example (14), *known* has a functional meaning and substantiates the application of boosters or hyperbolic language in this section.

In the present study, the frequency and distribution of attitude markers in each move of Discussions were also explored. Forestry writers tended to apply the highest percentage of attitude markers in Move 14 (81.90%) to consolidate their findings through comparing and contrasting them with those from other studies. As expected, attitude markers (81.90%) together with boosters (89%) exhibited the highest percentages in this move, as the most explicit indicators of the writer's authorial positioning (Hyland & Jiang 2018). With career pressures on academics to publish and more than three million new peer-reviewed articles appearing each year (Johnson et al. 2018), there are even more incentives to rhetorically promote results and professional visibility on the writers' side. Move 16 included the lowest percentage (2.8%) of attitude markers, suggesting that forestry writers are reluctant to incorporate their personal judgments, acting more objectively in offering recommendations for further research in the field.

(15) *Furthermore, even with long gradients, a considerable fraction of species having truncated realized response curves is **expected** to be found.* (R) [M14]

In Example (15), *expected* has the functional meaning 'likely to happen' and is considered as an instance of attitude markers.

Regarding self-mentions, in this section there were no cases of *singular* or *the other* self-mentions. They displayed the highest percentage in Move 14 (82.4%), followed by a huge gap in Move 15 (10.6%), then in Move 13 (4.1%), and finally in Move 16 (2.7%). The high percentage of plural self-mention pronouns in Move 14 could reflect a sense of responsibility on forestry authors' part to declare their active contribution in consolidating the findings. It suggests that

more than one person has endorsed the accuracy, quality and meaning of the results. Harwood (2005) proposed that the use of pronouns *I* and *we* indicates that the author/s deserve to be noticed as active players in the discourse community. The lowest percentage of self-mentions in Move 16 implies that forestry authors prefer an impersonal stance in offering recommendations for further research.

(16) ***We*** *suggest that future studies explore the role of surviving trees and dead trunks in maintaining bird populations in damaged forest.* [M16]

In Example (16), *we* is considered as an example of a self-mention, highlighting the authors' role in suggesting recommendations for future studies. We and our can also be considered as engagement markers, depending on the context.

4.5 Stance markers in research articles

Table 7 shows the distribution patterns of stance markers in the forestry research articles, calculated per 1,000 words.

Stance markers	Hedges	Boosters	Attitude markers	Self-mentions
Number of tokens	1,541	822	272	922
Frequency per 1,000 words	7.85	4.19	1.38	4.19

Table 7: Overall frequency of stance markers in research articles

According to Table 7, in terms of the number of tokens, overall, hedges (1,541) and self-mentions (922) are the two highest frequency indexed stance markers in the forestry corpus. The detailed frequency account of each feature is reported in Table 8.

Stance markers	Introduction		Methods		Results		Discussions		IMRD	
	RN	%	RN	%	RN	%	RN	%	RN	%
Hedges	251	16.28	491	31.86	214	13.80	585	37.96	1,541	43.32
Boosters	92	11.19	128	15.57	190	23.11	412	50.12	822	23.10
Attitude markers	73	26.83	63	23.16	31	11.39	105	38.60	272	7.64
Self-Mentions	103	11.17	399	43.27	55	5.96	365	39.58	922	25.92

Table 8: Frequency and percentage of stance markers in each section

Hedges (43.32%) were reported as the highest indexed stance markers, followed by self-mentions (25.92%), boosters (23.1%), and finally attitude markers (7.64%). The prominence of hedges (43.32%) in the forestry corpus

can signal a diverging pattern from the marketing or pseudo-exciting language marked by boosters and attitude markers. Nonetheless, hyping, marketing discourse is observed in certain sections such as the Results and Discussion. By applying more hedges than boosters in the corpus, forestry writers generally seem to adopt a flexible and modest stance, providing space for readers for alternative interpretations, signaling more objective, metric-based, calculated stance. Hyland and Jiang (2018), studying sociology, applied linguistics, biology and electrical engineering, observed a comparatively notable rise of hedges and self-mentions in the hard-science fields. Muangsamai (2018) also analyzed research papers in health and medical sciences and found that hedges were the key linguistic features. Examining 800 impact studies from the academic spectrum disciplines to explore the rhetorical presentation of impact, Hyland and Jiang (2023) found that chemistry and physics contained the most hyping or boosting items with fewer hedges as they moved along the hard/pure - soft/ applied continuum. Another line of research, however, has shown an opposite trend in the application of stance markers in hard knowledge disciplines. For instance, Khedri, (2014) found that hedges as a means of masking writers' part in explaining data, weighing up arguments, and making reference to audiences, were limitedly applied in hard science disciplines. Similarly, in a diachronic study of biomedical research articles over a 50-year period, Poole et al. (2019) found that boosters as epistemic stance markers pointing to greater degrees of certainty increased, while hedges as indicators of doubt and uncertainty decreased.

The second-highest frequency stance markers in forestry research articles were self-mentions (25.92%), exclusively the first-person plural pronouns *we*, *us* and possessive determiners *our*, or the category of *others* (*this study*, *the present study*, *the current study*). This finding aligns with a cross-disciplinary study by Khedri et al. (2015), where plural pronouns *we*, *us*, *our* dominated, attributed to the collaborative nature of research practices in the hard sciences. Hyland (2005) suggests that in hard-science disciplines, emphasis is placed on research practices and methodological procedures rather than overtly announcing findings through singular self-mention pronouns. In contrast, writers in the soft sciences often need to reinforce their discourse more overtly through singular self-referential language to claim authority since their research outcomes might not be solely based on confirmed quantitative research methods. Indeed, forestry writers have chosen to assert their contribution in their texts through the use of self-mentions, promoting their research and asserting their authorial presence. In the attention economy, first-person pronouns, alongside hypes, are considered key components of a comprehensive rhetorical toolkit to underscore personal impact and assert contribution within the broader discourse community (Hyland 2023). The

occurrence of self-mentions, as the second-highest frequency stance markers, further implies that forestry texts have shifted away from the detached, formal and impersonal style of writing, towards more informal and involving discourse. Several studies have revealed that academic discourse is not frozen and faceless anymore, but rather it has become more informal and impersonal (Bazerman 1988, Salager-Meyer 1994). Hyland and Jiang (2017) observed that academic texts in hard-science domains have become less formal, compared to soft-science domains, with higher cases of self-mentions and relaxed conventions.

Self-mentions were most prevalent in the Methods sections (43.2%), reflecting the collaborative nature inherent in this section. Hyland and Jiang (2017) conducted a study across four disciplines encompassing both the hard (biology, engineering) and the soft sciences (applied linguistics, sociology) over a span of 50 years. Their findings indicated a slight increase in informality features in both fields, with first-person pronouns serving as the primary marker. However, the hard sciences experienced a more pronounced increase in informality compared to the soft sciences. Habibi and Hyland (2019) acknowledged that academic writing is not entirely devoid of personal engagement. Writers establish credibility for their prose by projecting an identity bolstered through individual authority, demonstrating confidence in their assessments and commitments.

5 Conclusion

This study has sought to identify the distribution of stance markers across the rhetorical moves of forestry research articles. One notable finding is that hedges and self-mentions prevailed throughout the forestry corpus, while attitude markers and boosters were less commonly employed. Hedges linguistically manifest flexibility, tentativeness, and respecting the readers' interpretations, serving as a prudent choice to indicate provisional claims subject to potential objections or revisions. The higher application of hedges compared to boosters in forestry as a hard science, could reflect a discernible shift in commitment patterns, from more personal beliefs towards more objective judgements in this discipline. In this study, forestry authors prioritized projecting a flexible and approachable persona over the conventional use of boosters, which has been associated with a more formal and "stuffy orthodoxy" (Hyland & Jiang 2017: 41). Boosters and attitude markers used to be considered as the most obvious indicators of exposing writers' authorial positioning, conveying commitments and affective evaluations in academic texts. However, more recently, the substantial fall in boosters and attitude markers is regarded as an important shift from commitments expressed as personal beliefs towards those which seek to convey more objective, data-supported assurances by Hyland and Jiang (2018).

In regard to first-person pronouns, they were documented as the second-highest frequency stance markers in the current corpus, indicating a shift in formality and impersonality patterns in forestry research articles. Positivism or empiricism has traditionally been associated with the application of passive structures that marked impersonality to reinforce the credibility of the writer (Ryan 2006). However, forestry authors seem to have shed the old constraints and adopted a more personal and relaxed persona in writing research papers. To gain visibility in the contemporary attention economy era, to promote their research outcomes, researchers are incorporating self-mentions, rather than passive structures, more frequently in their research in recent years (Hyland 2023).

Analyzing each section individually, hedges and attitude markers emerged as the predominant stance markers in the Introductions. In the Methods section, hedges and self-mentions were prominent. Boosters and attitude markers dominated in the Results. Moving to the Discussions, boosters and self-mentions prevailed. Overall, forestry writers displayed a tendency to apply hedges in the Introductions and Methods, while opting for boosting language to emphasize their research outcomes in the Results, and to project certainty and assertiveness and to promote their arguments in the Discussions. The widespread use of such hyping practices in scientific publications may undermine objectivity, leading to sensationalism and a sense of pseudo-authenticity or manufactured excitement (Scott & Jones 2017). As writers exaggerate significance of the findings, they question the impartiality of science, promote skepticism and detach readers (Horgan 2015), turning science into a "theatrical business" (Wheatley 2014: 14). A higher proportion of self-mentions in the Methods and Discussions indicates that authors in this field tend to emphasize their role as active participants in the former and promote their involvement as enthusiastic contributors in their arguments in the latter, respectively. The pervasive use of attitude markers in Introductions indicates the pivotal role of affective voice in persuading readers of the importance of the study topic, gap, and objectives. In the Results sections, the prevalence of attitude markers may convey reinforcing the persuasiveness of the presented findings in a more involving, personal tone. Indeed, studies of this nature bring to attention the value of factors beyond content that contribute to writing persuasive research articles, highlighting the significant role of predicting and addressing readers' evaluations of the text. Interpreting textual patterns in a functional manner, by analyzing metadiscoursal features in each move, is likely to provide insights for making informed rhetorical decisions while composing each communicative unit of a research article. This approach aids not only advanced-level and non-native writers but also novice and native writers in crafting persuasive and professional academic texts.

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