

Rhetorical Moves and Linguistic Realization in Q1 Scopus-indexed Biochemistry Abstracts

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Abstract:

Abstracts play a critical role in academic dissemination, yet many novice non-native researchers struggle to align their writing with rigorous disciplinary conventions. Despite the existing research on abstract structures, there remains a lack of micro-level analysis that focuses on the specific genre characteristics and disciplinary conventions specifying the ideal realization model in Q1 biochemistry journals. This study employs a qualitative genre analysis that aims to assist researchers in communicating their research findings by outlining the rhetorical structure in biochemistry abstracts and revealing the linguistic characteristics commonly associated with specific informational moves. A corpus of 100 research article abstracts published in high-impact Q1 Scopus-indexed biochemistry journals, was gathered and analyzed according to Hyland's (2000) five-move rhetorical model. To ensure accuracy, inter-rater reliability was established, achieving an initial agreement level of 87.35%. The subsequent analysis reveals that Move 4 (Results) is the most dominant (99%), reflecting the highly-results oriented conventions of the biochemistry discipline. Also, the study found that the researchers use "rhetorical compression" to meet strict word limits by embedded methodological details with result statements. These findings show the conventions of high-impact publishing. Ultimately, these results give novice researchers guideline on how to manage the limited space in abstracts while trying to achieving the results-oriented publication of reputable international journals.

Keywords: *biochemistry abstracts, genre analysis, linguistic realizations, Q1 Scopus journals, rhetorical move analysis*

1. INTRODUCTION

Abstracts are a significant part of research papers in academic writing, including background, purpose, method, results, and conclusion. They give readers a brief yet comprehensive overview of the study's principal topic. An abstract is not only a summary but an organized part of scientific communication that shows the framework and distribution in a subject (Kurniawan, 2023; Kurniawan et al., 2019; Kurniawan & Sabila, 2021; Pratiwi & Kurniawan, 2021; Suherdi et al., 2021). Abstracts are often the reader's first introduction to a study and their rhetorical structure shows the author's style and knowledge of disciplinary rules.

Abstracts often provide the reader's first impression of a study, reflecting the researcher's rhetorical style and their knowledge of the disciplinary conventions. Within this high-stake environment, the increasing pressure to publish in Scopus-indexed journals has increased the urgency for researchers to be skilled in the genre conventions that are well established, especially for non-native English speakers who often find it difficult to meet these academic standards (Suherdi et al., 2020, 2021). Usually, the difficulties are related to differences in the rhetorical arrangement rather than mere issues of vocabulary or grammar (Pratiwi & Kurniawan, 2021). Indeed, previous studies have proven that authors with different linguistic background tend to have different rhetorical principles in describing the objectives and outcomes of the study (Kurniawan et al., 2019; Kurniawan & Sabila, 2021; Lubis et al., 2022; Pratiwi & Kurniawan, 2021). This is particularly true in the demanding scientific fields, which train scientists to reduce complex data to factual, accurate phrases that value objective description over interpretive language.

Biochemistry's importance was underscored by its high-impact and rapidly developing nature. It was a challenging intense science with a high rate of discovery and a lot of rivalry (Becher & Trowler, 2001). It requires a certain degree of rhetorical precision that is not found in the larger sciences, given to the severe limitations of space and rejection rates for indexed journals. Consequently, the words used should be extremely brief and convey complex empirical data.

However, omissions from rhetorical conventions are common for novice or non-native authors, and this presents a considerable obstacle to international publication, despite the disciplines established needs. Previous research between student and professional writing reveals that novice writers tend to be ineffective at organizing a space by using too many words on background information and leaving out the key outcome sentences (Ren & Li, 2008; Suhadi, 2022). In addition, research on meta-discourse characteristics shows that the strategic distribution of engagement markers across movements is often challenging for non-native researchers (Amnuai, 2019). These investigations indicate common structural challenges, but remain insufficient for today's high-impact Q1 Scopus-indexed setting for three key reasons. First, fundamental work on move analysis in biochemistry, e.g. Kanoksilapatham (2005), provided broad structural frameworks and almost two decades old and does not reflect the increasing pressure for rhetorical compression in modern high-impact journals. Second, current cross-disciplinary research tend to focus on the identification of moves at macro-level, ignoring the micro-level linguistic realizations (e.g. specific reporting verbs and tense shifts) that enable move to work well under tight word limitations. Third, current literature lacks a definitive, integrated comprehensive framework that links rhetorical purposes with specific linguistic features for the discipline of biochemistry. This leaves a crucial gap in understanding the specific linguistic methods required to get published in reputable journals. For the absence of this micro-level alignment, high-quality experimental results can be rejected due to a lack of disciplinary rhetorical precision.

The biochemistry field requires a results-oriented precision that is essential for examining a corpus that demonstrates proficiency in these specific disciplinary standards. In this context, this study aims to investigate the rhetorical moves and linguistic realizations in biochemistry abstracts published in reputable international journals. By analyzing the microstructure and linguistic strategy used in the corpus, this study hopes to provide a definitive framework of scientific writing conventions, offering a standard for inexperienced and non-native researchers who struggle with the limited space for abstracts. Therefore, this study is determined by the following research question: How do the dominant rhetorical move patterns and their linguistic realizations in Scopus-indexed biochemistry abstracts reflect the disciplinary conventions of high-impact scientific writing?

2. LITERATURE REVIEW

2.1 Rhetorical Move Analysis

Rhetorical Move Analysis (RMA) has become a key analytical approach. Derived from theory by Hyland (2000), RMA identifies how texts are structured into defined communication units, or “moves,” each serving a specified purpose. Hyland (2000) developed a five-move model for research article abstracts: (1) Introduction, (2) Purpose, (3) Method, (4) Results, (5) Conclusion. This framework has been widely applied to examine how researchers systematically and logically deliver findings from their research. Analyzing the move structure helps identify the writer’s awareness of disciplinary and communicative norms (Kurniawan & Sabila, 2021). The approach and sequence of moves frequently show how experienced researchers structure their abstracts to communicate information effectively.

2.2 Abstract Writing

Research article abstracts are influenced by journal indexation, author background, and disciplinary setting in terms of their rhetorical completeness, as previous studies on abstract writing often show. Generally, abstracts in higher quartile Scopus publications (Q1/Q2) likely to have more complete and systematically structured move frameworks than lower-indexed national journals (Kurniawan et al., 2019). In particular, abstracts of higher-ranked papers tend to stress Move 1 (Introduction) and Move 4 (Results) which suggests a straightforward presentation of study objectives and outcomes (Kurniawan & Sabila, 2021; Lubis et al., 2022)

Linguistic background and disciplinary conventions also affect rhetorical preferences. While comparing the English and Indonesian abstracts, English abstracts tend to state study objectives and results directly. Meanwhile, Indonesian abstracts tend to focus more on background information (Pratiwi & Kurniawan, 2021). There are also important differences between particular academic subjects, beside indexation. The indexation impact on rhetorical completeness is further reinforced by medical and scientific researches. Research abstracts in health science show that journals in higher rank have more consistent realization of moves in the Introduction, Purpose, Method and Results (Lubis et al., 2022). In these fields, the “Results” move is often the longest, including detailed statistical information.

Biochemistry demonstrates a discipline that is result-oriented to a significant extent, where the purpose of communication is mainly to report empirical results with a high precision and clarity (Kanoksilapatham, 2005). In contrast, abstracts of engineering and technology research have a different rhetorical structure that makes these abstracts tend to highlight the “Method” and “Procedure” elements (Stotesbury, 2003). But research in the social sciences and humanities,

including applied linguistics, has shown a tendency to favor more communicative frameworks (Lubis et al., 2022). The results of these comparisons indicate that the quality of an abstract is relative and an abstract that considered full in medicine may be regarded as methodologically incomplete in engineering or contextually incomplete in sociology.

3. RESEARCH METHODOLOGY

The current study was conducted by the qualitative design to investigate the rhetorical structure and linguistic realizations of biochemistry research article abstracts. The approach allows for a descriptive function rather than a fully quantitative design, by compiling a corpus of 100 abstracts from reputable biochemistry publications, permitting a broad investigation of the use and distribution of well-formed linguistically rhetorical moves across the selected abstracts (Suherdi et al., 2020).

The corpus was methodically acquired using a snowball sampling technique from Scopus.com, aiming to produce a comprehensive and significant dataset. This method, described as the act of following the references given in citations to find good quality sources (Malinauskaite et al., 2019), enabled the triangulation of sources and the inclusion of a wider variety of relevant data. To ensure that the corpus contains abstracts that have the highest standard of disciplinary conventions in biochemistry, the selection procedure began with the writings of Edward Sargent, a world-renowned scientist in the discipline of biochemistry. From this entrance point, the snowballing process was continued to include 568 distinct researchers to mitigate individual authorship bias.

Through a thorough process of examination and synthesis, a total of 100 abstracts of research articles were finally selected for the final corpus out of 115 abstracts initially uncovered. The corpus was built using a snowballing technique and the selection was purposefully controlled by the following criteria to guarantee that the corpus contains competent and respected sources in the field: (1) Abstracts had to be published in Q1 biochemistry journals indexed in Scopus, (2) The text had to be an abstract of a primary research publications, and (3) All selected texts were written in English.

The abstract is considered as an organized discourse in which each ‘move’ fulfils a certain communication function. The study was conducted by employing Hyland (2000) rhetorical move model as shown in Table 1.

Table 1 *Move analysis model according to (Hyland, 2000)*

Move		Step	
M1	Introduction	S1	Arguing for topic significance
		S2	Making topic generalization
		S3	Defining the key term(s)
		S4	Identifying gap
M2	Purpose		Stating the research purpose
M3	Method	S1	Describing participants/data sources
		S2	Describing instrument(s)
		S3	Describing procedure and context
M4	Findings		Describing the main results
M5	Conclusion	S1	Deducing conclusion
		S2	Evaluating the significance of the research
		S3	Stating limitation
		S4	Presenting recommendation or implication

The analysis was conducted through several systematic stages. First, research article abstracts were gathered from Q1 Scopus-indexed publications authored by experienced researchers in the field of biochemistry, ensuring the data reflects high-impact scientific writing standards. A total of 100 abstracts were collected and extracted to Microsoft Excel data for coherent data management to simplify categorization and calculation of the move-step analysis. Next, each abstract was divided into sentences, which functioned as the unit of discourse analysis. The data of the corpus were analyzed by outlining a top-down approach as suggested by Biber et al. (2007) starting with predefined communication strategies. Therefore, Hyland's (2000) five-move model and its step were adopted as the functional framework for identifying rhetorical structure in the corpus. Each sentence was systematically categorized into its relevant rhetorical move and step according to Hyland's (2000) five-move model.

To assure the accuracy of the move-step coding, inter-rater reliability was established based on the framework from Al-Otaibi & Hmoud M. (2015) to assure the accuracy of the move-step coding by involving two experienced discourse researchers who discussed the analysis of selected abstracts with their identical coding scheme. Following the methodological justification by Kanoksilapatham (2005), 25% of the total corpus was randomly selected and independently coded by both raters to ensure a representative sample for reliability testing. The initial agreement level between the two raters reached 87.35%, which indicates a high degree of consistency and reliability in the identification of rhetorical moves, inconsistencies were reconciled through in-depth discussion until agreement was achieved. The coded data was then organized and analyzed to determine the distribution of rhetorical moves and steps within the corpus.

Table 2 *Move-Step Labelling*

Research Article Abstract no. 35		
Name of Journal: Journal of Materials Chemistry A		
Year of Publication: 2017		
Affiliation: Canada		
Content	Move	Step
Direct formic acid fuel cells hold great potential for utilizing formic acid as an energy source via formic acid oxidation (FAO).	M1	S2
We report a new anodic material composed of branched Pd nanoparticles (BNPs) with enhanced performance for the electrocatalytic FAO reaction.	M4	
The results of computational studies indicate that the surface morphology of the nanoparticles favours the binding of FAO intermediates while allowing for field-induced reagent concentration (FIRC) at sharp tips leading to amplified catalytic activity and improved stability.	M4	
Our findings highlight the importance of morphological control of high-energy surfaces for effective fuel cell anodes.	M5	S2

To address the second part of the research question, the linguistic realization analysis focused on lexical features, including reporting verbs, verb tense, and evaluative language. This analysis was conducted by identifying recurring linguistic markers that signal the communicative intent of each move.

4. RESULTS AND DISCUSSION

Prior to presenting the main findings, Table 2 illustrates how the move-step labelling procedure was applied to a sample abstract from the corpus, showing how each clause was assigned to its corresponding move and step.

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Analysis of linguistic realization concentrated on lexical characteristics reporting verbs, verb tense, and evaluative wording that recur across the corpus. Recurring linguistic markers signalling the communicative intent of each move were identified inductively, and their distribution was subsequently interpreted in relation to the move-step findings and to recent corpus-based research on academic reporting verbs (Praminatih, 2023; Tocalo, 2021) and verb tense(Wahyu, 2016).

A total of 638 rhetorical units were identified across the 100 research article abstracts sampled from the biochemistry field. All five rhetorical moves proposed in the coding scheme were realized in the corpus, although their frequency of occurrence varied considerably. The following sub-sections present the distribution of the moves and steps, examine their linguistic realization in greater depth, and discuss the move-pattern configurations, situating each set of findings within genre theory and the wider body of move-analysis scholarship.

4.1. Salience of Rhetorical Moves

The distribution of move and step salience in the corpus points to an uneven, rather than uniform, rhetorical structure. Following Kanoksilapatham (2005) classification, a move or step was labelled obligatory when it occurred in 100% of the abstracts, conventional when it occurred in 60-99%, and optional when its frequency fell below 60%. Table 3 summarizes this distribution.

Table 3: Move-step salience

Move	Salience	Step	Salience
1	87%	1	61%
		2	66%
		3	7%
		4	12%
2	74%	N/A	
3	55%	1	3%
		2	5%
		3	51%
4	99%	N/A	
5	31%	1	11%
		2	11%
		3	1%
		4	8%

None of the five moves reached the strict 100% threshold required for obligatory status, which indicates a genuine degree of rhetorical flexibility across the corpus rather than a fixed template. Move 4 (Results) nevertheless came closest, appearing in 99% of the abstracts and consequently classified as conventional. This near-total presence reflects the strongly empirical orientation of biochemistry as a discipline: authors treat the reporting of concrete findings as the abstract's non-negotiable core, a pattern consistent with Kanoksilapatham (2005) foundational description of biochemistry research articles as genres built around the delivery of experimental outcomes. The same emphasis on results has recently been confirmed in a directly comparable corpus of highly cited, Scopus-indexed biochemistry articles by Kurniawan et al. (2026), who likewise found the Result move to be one of the most consistently realized moves in their abstract data (86.7%), even though their overall five-move distribution drawn from Hyland (2000) framework differs somewhat from the present findings, most notably in the salience of the Method move. Read together, the two studies suggest that the primary of the results-reporting move is a capable disciplinary feature of biochemistry writing rather than an artefact of a single corpus.

This results-first orientation distinguishes biochemistry abstracts from those produced in the humanities and social sciences, where interpretive or evaluative moves tend to occupy proportionally more textual space (Ebadi et al., 2019). Recent genre-analytic study outside the hard-sciences has identified similar disciplinary contrasts: Belleza (2026) comparing local and international abstracts from applied linguistics found that the Purpose, Methodology, Result and

Conclusion were obligatory moves. The conclusion was realized much more consistently (65-75%) than in the present biochemistry corpus (31%). While Triyanna et al. (2025) reported conclusion is the least frequent move (38.7%) but still much more frequent than in biochemistry. The comparison suggests that while the Purpose-Method-Result core is broadly shared across disciplines, the readiness of authors to append an explicit evaluative or concluding statement is discipline-specific, and biochemistry writers appear least inclined to do so, preferring instead to let empirical results carry interpretive weight on their own a point developed further in Section 4.3.

Move 1 (Introduction) and Move 2 (Purpose) were both classified as conventional, occurring in 87% and 74% of the abstracts, respectively. This implied that although setting the research background is not a necessary, most authors think that it is a near default requirement to legitimize the contribution of the study before the results are shown. However, this context is usually established more briefly in biochemistry as compared to soft-science genres, where the Introduction move is often extended to a more elaborate rhetorical sequence establishing a domain, a niche, and the present work (Al-Najhi & Samaha, 2023). Also, the three-stage Introduction structure described for high-impact biochemistry papers, which is nevertheless quite compact (Kurniawan et al., 2026). Biochemistry questions are often posed within the framework of a well-defined and accumulated earlier work. Authors are able to then assume a common disciplinary background in order to effectively shorten the contextualizing move.

Conversely, Move 5 (Conclusion) was the least crucial move overall (31%) and Move 3 (Method) was accomplished in only 55% of the abstracts, falling just short of standard status. This pattern is indicative of a disciplinary presumption that the subject matter is sufficiently expert to comprehend data without extra evaluative comments, and that widely standardized laboratory or computational processes are not required to be explicitly laid out in the abstract. The method's relative compression is contrasted to sectors such as engineering, where the description of the method is often foregrounded as evidence of technical innovation (Kanoksilapatham, 2013). Instead, the implicit assumption in biochemistry seems to suggest that methodological precision is taken for granted and the resulting abstract space is given over to what has the method generated rather than how it was carried out.

At the step level, no individual step achieved obligatory status either underscoring the concept that rhetorical choice acts not only between moves but also within them. In Move 1, both Step 1 (topic generalization) and Step 2 (specifying the study's emphasis) were conventional, indicating that the authors tended to direct the readers to the research field and subsequently narrow down the focus, whereas rarely moved on to the later steps of identifying a gap or reviewing prior literature in detail. But Step 3 (describing the procedure) in Move 3 acquired a moderate level of salience where it precisely stated procedures even though other methodological stages are missed. Other recent step-driven analyses of study genres also support this step-level variability, identifying that steps within a move are rarely performed with the same frequency (Yoon & Casal, 2020).

Overall, the results suggest that abstract of biochemistry articles published in high-impact Scopus-indexed publications are structured around a concise, results-oriented rhetorical move (Introduction-Purpose-Result) with Method and Conclusion as optional or semi-optional elements, selectively rather than comprehensively deployed. This use pattern, in terms of genre theory (Bhatia, 2014; Swales, 2004), illustrates how an established discourse community strategically capitalizes on conventional move reports, but these are not applied mechanically yet

adjusted according to what the community values most here, immediate and unambiguous communication of empirical outcomes.

4.2. Occurrences of Rhetorical Moves

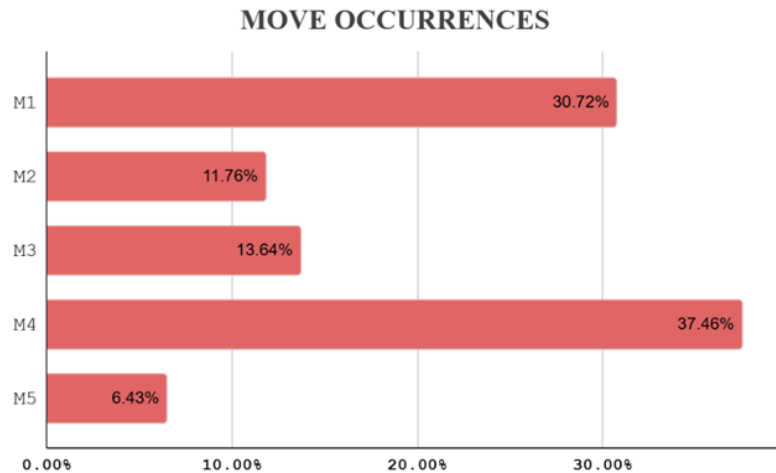


Figure 1. Occurrences of the Move

Figure 1 illustrates the equal frequency of each move across all coded cases in the corpus. Move 4 (Results) has the highest frequency (37.46%), followed by Move 1 Introduction (30.72%) and Move 3 Method (13.64%), while Move 2 Purpose (11.76%) and Move 5 Conclusion (6.43%) are substantially less frequent. This distribution supports the illustration shown in Section 4.1 where rhetorical space of the abstracts is dominated by results reporting and contextual framing, indicating the pressure in high-impact publishing to establish empirical clarity as soon as feasible. The dominance signals of Move 4 point out to the biochemistry researcher's continued preference for the articulation of findings above other communication purposes, pointing to the primacy of results reporting to the genre. Examples 1 and 2 present this realization.

Example 1

As a result, the optimal growth conditions are also different for the distinct halide perovskites: growth should be... (Abstract 30, 2015, M4)

Example 2

*We further **demonstrate that ultrafast decay** pathways unique to heavy heteroatom-containing polymers **are apparent** in both planar and bulk heterojunctions and thus not dependent on polymer-fullerene mixing or polymer assembly.* (Abstract 5, 2018, M4)

Move 1 (Introduction) and Move 2 (Purpose) both occur with a sufficient regularity, which indicates that authors often situate their study in a broader scientific content before or even simultaneously conveying their specific purpose. The frequent use of Move 1 indicates a continuous occurrence of Move 2 demonstrates the significance attached to the precise statement of the study's purpose. The implementation of Move 2 illustrates in Example 3.

Example 3

Realization of colloidal quantum dot (CQD)/organic photovoltaic (OPV) tandem solar cells that integrate the strong infrared absorption of CQDs with large photovoltages of OPVs is an attractive option toward... (Abstract 18, 2018, M1S2)

This tendency toward result is consistent with the finding of Triyanna et al. (2025), whose comparative research of Q1-Q4 linguistics and language journals are found the Result move in 78 of 80 abstracts (97.5%) which the most frequent move in their corpus. The corpus taken from a hard-science rather than a soft-science discipline, but the pattern observed here is consistent with their conclusion that writers are increasingly using the abstract not only as a summary but also as a showcase for the study's key recovery. A related observation comes from Firdausyiah & Roselani (2025) remark how competitive internationally indexed journals are putting increasing pressure on authors to emphasize outcomes over contextual elaboration as a manner of signifying the uniqueness and disciplinary significance of a study. These align results, considering the biochemistry-specific corpus of Kurniawan et al. (2026) where the result move was also one of the most notable, point to an increasing prioritization of findings over context across both hard and soft science reporting conventions, and not limited to biochemistry alone. While Move 3 (Method) and Move 5 (Conclusion) are comparatively infrequent realizations. Methodological information continues to be significant, but less likely to be presented in an adequate and self-contained way. This implies that procedural detail is usually reduced. Some might see the compression as a purposeful response to the standards imposed by credible Scopus-indexed, such as tight word limits and competitive rejection rates that force authors to optimize each clause. In an effort to save space for the discoveries referees and readers are most likely to read and authors can include methodological information in the results or even avoid usual procedures completely, therefore strengthening the abstract's argumentative effect in a strictly constrained style. Move 5 is the least realized move of all, which indicates that explicit evaluative criticism that typically omitted. The implementation is shown in Example 4.

Example 4

These, along with capacitance-frequency measurements, suggest that hollow sites limit the mobility of the halide vacancies. (Abstract 42, 2023, M5S1)

This pattern aligns with recent corpus-based studies that observed a tendency in high-impact journals to restrict conclusion-based phrases in preference to results-oriented statements (Alyousef, 2021; Triyanna et al., 2025). It implies that authors assume readers to draw evaluative conclusions directly from the presented data, reducing the apparent necessity of a separate concluding statement. This compression expression is consistent with Swales (2004) understanding of a discourse community's established expectations of genre efficiency. Experienced writers demonstrate their competence not by completely applying every conventional move, but by carefully leaving some moves unstated, as here, Conclusion, when the results are considered simple to understand. The corpus also has move blending at the clause level, in which numerous abstracts Move 3 (Method) and Move 4 (Results) are combined into one sentence, with methodological information at the beginning of the clause and the finding presented right after. The following embedded structure ensures a linear move sequence, but at the same time enables the rhetorical compression that seems to be a crucial approach of brief abstract writing, as illustrated in Examples 5 and 6.

Example 5

*The devices are fabricated on hydrophobic poly(triarylamine) (PTAA) surfaces, **using key strategies such as** solvent engineering, enhanced ink-substrate dynamics, and surface passivation, **enabling** a power conversion...* (Abstract 86, 2020, M3S3-M4)

Example 6

***By incorporating** organic small molecules and **conjugated** polymers into cesium tin iodide (CsSnI₃) perovskites, **we achieve** carrier density tunability over 2.7 decades, transition from a temperature-dependent semiconducting to a metallic nature, and high electrical conductivity exceeding 200 S/cm.* (Abstract 27, 2023, M3S3-M4)

In previous analyses of abstracts from Scopus-indexed journals (Kurniawan et al., 2024; Tamela, 2020) similar embedded realizations have been reported, indicating that clause-level move combines is a significant feature of abstracts written for high impact international publication where every word needs to be justified against a strict word limit. Additionally, within general terms, there are five other full conventions for biochemistry authors, although their application is selective and unevenly distributed. In other words, the dominance of Move 4 and the flexibility of Method and Conclusion imply a genre convention that prefers to focus on brief, results-oriented abstract writing rather than on thorough rhetorical completeness.

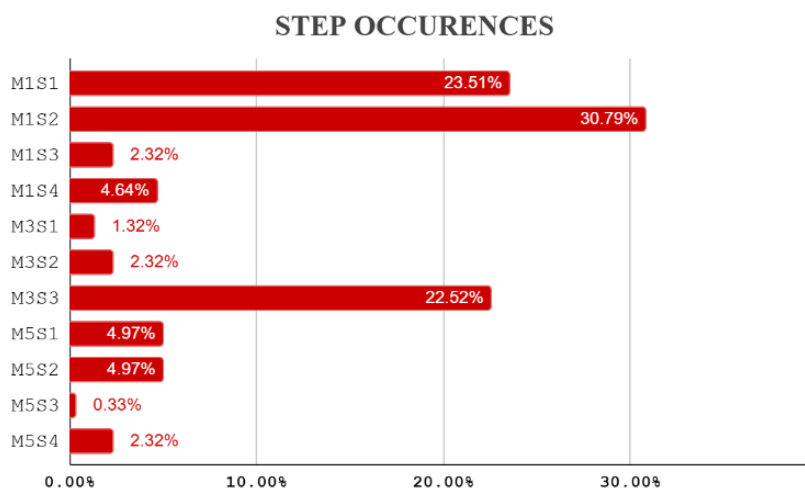


Figure 2. Occurrences of the Step

At the step level, M1S2 (30.79%) and M1S1 (23.51%) were the most common stages achieved overall, suggesting that a priority is given by authors to establishing the study topic and providing general background information at the very beginning of the abstract. This finding shows that the Introduction move is not only prominent at the move step level (Section 4.1) but is also internally weighted toward its earliest, most orienting steps. M1S3 (2.32%) and M1S4 (4.64%), by comparison were markedly less frequent, suggesting that authors are relatively reluctant to explicitly flag a research gap or to review prior studies at length. This pattern is consistent with the finding by Karimah et al. (2023) that authors in specialized scientific domains often skip an explicit “gap” phase (M1S4), probably suspecting that intended readers are already conscious of the current issue in the field.

In the third move, M3S3 (22.52%) was the most dominant step by far, much higher compared to M3S1 (1.32%) and M3S2 (2.32%). This distribution shows a distinct tendency for the description of procedures and analytical processes as a single unit of formation rather than a separate elaboration of participants or instruments where the methodological content is typically simplified, not categorized. Example 7 illustrates this tendency.

Example 7

A microfluidic platform then separates antigen-presenting cells with high throughput and specificity. (Abstract 7, 2022, M3S3-M3)

As shown in Example 7, one procedural clause can express both research context and analytical procedure. This matches the result of Soy et al. (2023) in health-science abstracts that the Method section is a “obligatory” yet highly compressed step, with details such as instrument wrapped into broader procedures description to maintain scope. For Move 5, all four steps were realized, however, only at low frequencies. M5S1 (4.97%) and M5S2 (4.97%) were more frequently used than M5S3 (0.33%) and M5S4 (2.32%). This means that when authors do include a concluding statement, they prefer to make a brief statement of an implication or restate a result so that they can make an explicit evaluative comment or forward-looking recommendation.

The low frequency of the final stages shows that conclusions are not viewed as a major rhetorical element in biochemistry abstracts. The high frequency of stages, such as M1S2 and M3S3, suggests that authors are strategically simplifying rhetorical function to address both the space constraints of the abstract and audience expectations for concise and comprehensive summaries.

4.3. Linguistic Realizations of Rhetorical Moves

Since move analysis by its own tells us what an abstract does without fully explaining for how each move is linguistically constructed, this section looks at the lexical and grammatical resources – reporting verbs, tense choice and evaluative language through which the moves identified above are realized. According to recent corpus-based research on reporting verbs (Praminatih, 2023; Tocalo, 2021), verb tense in abstract writing (Wahyu, 2016). The linguistic patterning of the corpus can be understood with the same depth of comparative grounding as the move-level findings in Sections 4.1 and 4.1.

The dominance of Move 4 (Results) which, as seen above, exceeds 99% coverage of the abstracts has a strong effect on the linguistic characteristic of the corpus. This dominance is achieved by a restricted but constant range of factual reporting verbs, that most typically show, reveal and demonstrate. These verbs align with the fourth function of Praminatih’s (2023) taxonomy by determining research findings which her comparative study identifies as the primary rhetorical role of reporting verbs in scientific abstracts. Moreover, the heavy reliance on this single function in the present corpus internally linguistically meaningful, as it shows that biochemistry authors prefer verbs that convey information as an established, external fact instead of the author’s own claim, so establishing objectiveness conventionally valued in natural sciences Hyland (2000). This preference also matches Praminatih’s (2023) more general conclusion that reporting verbs in hard-science abstracts tend to be less argumentative and more descriptively used than their soft-science forms, as only two of the four rhetorical functions investigated were regularly attained outside hard-science writings.

Move 1 Step 1 (establishing topic significance) demonstrates a different lexical strategy. Authors are more willing to use promotional or evaluative terms in an effort to distinguish their study in a

competitive publication context. Phrases such as “is an attractive option” in Example 3 are evaluative by employing adjectival and comparative language to make a claim about the value of the study topic that comes before any data being provided. This demonstrates that the corpus is not completely free of authorial position-taking Hyland (2000) and in addition to its strong reliance on neutral reporting verbs, promotional language is located precisely where authors most need to attract reader interest at the point of topic framing and mostly absent from the results-reporting move where objectivity is highlighted. This distributional division between an evaluative Introduction and Results move provide the linguistic motivation for the dominance of Move 1 and Move 4 in the corpus, respectively, for different rhetorical reasons, one persuasive and the other justificatory.

Verb tense varies in systematic ways with communicative function. Move 1 is often identified by the use of the present tense, either to declare general disciplinary truths or to comment on current advancements in the fields, as in the illustrated phrase “Direct formic acid fuel cells hold great potential...”. In addition, authors are free to state their research challenge as well as their final conclusions, in the present tense, an established fact that is true regardless of the time when the study was conducted rather than a constrained, past event. The result directly supported corpus-based analysis of rhetorical moves and verb tense by Wahyu (2016) who also found that present tense is dominant across introduction, purpose, result, and conclusion moves while past tense was concentrated specifically in the method move a distribution that is almost the same as the present corpus. Also, the use of past tense dominates here in Move 3, in which used to give an objective description of the actual experimental procedure at a specific time, in accordance with the convention that found in the abstracts of accounting and applied-linguistics, but with different proportions of describing completed methodological steps in simple past (Wahyu, 2016).

Another linguistic aspect of the corpus is the recurring usage of non-finite participle constructions for example “enabling; and employing to compress Method and Result material into a single clause (Examples 5 and 6). This compression effected by the participle enables two communication functions to be expressed at the syntactic expense of a full additional sentence. The overall conciseness of the abstract is maintained and a consistent logical sequence from method to outcome is preserved. The reporting verb choices identified in the present biochemistry corpus correspond with the verb choices reported in other disciplinary and regional contexts which would suggest the existence of a broadly shared, internationally recognizable lexicon of reporting verbs that supports high-impact scientific abstract writing regardless of author background. Considered against Tocalo (2021) cross-varietal inventory of rhetorical verbs which identifies terms such as show, reveal, indicate and suggest as basic lexical realizations of the summarizing-findings move across Inner-, Outer-, and Extended-Circle English, the reporting verb choices identified in the present biochemistry corpus align with established global standards.

The linguistic patterns that observed collectively suggest that the move structure set out in Sections 4.1 and 4.2 cannot be fully understood without examining the lexico-grammatical choices that accomplish it. For instance, the near-obligatory status Move 4 is tied to its restricted list of neutral, evidential reporting verbs. In contrast, the conventional but rather brief realization of Move 1 depends on a shift toward evaluative, present-tense phrasing. Furthermore, the optional status of Move 3 is linguistically enacted through past tense, often participially compressed procedural clauses. This integration of move-level and linguistic-level analysis addresses a key methodological expectation in genre studies that rhetorical structure and its linguistic realization are examined mutually rather than treated as separable layers of description and positions the present findings

as a more complete account of how biochemistry abstracts achieve their communicative purpose (Hyland, 2000; Swales, 2004).

4.4. Move Pattern

Table 4. Move Pattern Configuration

Configurations	Pattern	Abstract
2Ms	1(n)-4(n)	7
	2-4(n)	2
	3(n)-4(n)	5
3Ms	1(n)-2(n)-4(n)	22
	1(n)-3-4(n)	3
	1(n)-4(n)-5(n)	5
	2-3(n)-4	2
	2-4-5	1
4Ms	3-4(n)-5	1
	1(n)-2-3(n)-4	26
	1(n)-2-4(n)-5	7
	1(n)-3-4(n)-5	6
5Ms	1(n)-2-3(n)-4-5(n)	12

The abstracts in the corpus were further classified according to the number of moves realized in sequence, including two-move, three-move, four-move, and five-move configurations (Table 4). The four-move configuration was the most frequently used overall (40 abstracts), indicating that most authors draw on a broad though still incomplete range of rhetorical strategies. Within this group, the sequence 1(n)-2-3(n)-4 was the single most common pattern, realized in 26 abstracts, suggesting that the typical rhetorical realization begins with an introduction, proceeds to state the purpose and method, and concludes with the presentation of findings, as illustrated in Example 8.

Example 8

[M1] *The analysis of cell-free nucleic acid (cfNAs), which are present at significant levels in the blood of cancer patients...* [M2] **Here we report** *an electrochemical clamp assay that aims to directly detect mutated sequences...* [M3] *The new chip-based assay reads out the presence of mutations within 15 minutes using a collection of oligonucleotides...* [M4] **We demonstrate** *excellent levels of sensitivity and specificity and show that the clamp assay accurately detects mutated sequences...* // (Abstract 100, 2015, pattern 1-2-3-4)

On the other hand, the three-move configuration 1-2-4 has been used with significant frequency, as seen by its appearance in 22 abstracts, which illustrates how some researchers decide to exclude specific moves, such as Move 3 or Move 5 while maintaining a coherent structure for their rhetorical organization. This pattern is demonstrated in the following example.

Example 9

*[M1] Controllable doping of semiconductors is a fundamental technological requirement of electronic and optoelectronic devices... [M2] **Here we show** an efficient in situ chemical route that **achieves** the controlled incorporation of trivalent cations... [M4] **We achieve** Bi³⁺ incorporation that leads to bandgap tuning, enhanced electrical conductivity, and a change in charge carrier type... **This work demonstrates** the successful incorporation of dopants while preserving the host lattice structure... //* (Abstract 46, 2016, pattern 1-2-4)

The complete five-move configuration, 1(n)-2-3(n)-4-5(n), appears in twelve abstracts. Although the full sequence of moves is realized here, its comparatively modest frequency confirms that it is not the dominant pattern within the corpus. Two-move configurations most notably 1(n)-4(n) are similarly infrequent, indicating that extremely condensed, two-move abstracts remain uncommon even within a genre that otherwise favors compression. These configurations are illustrated in Examples 10 and 11.

Example 10

*[M1] Band gap tuning in mixed-halide perovskites enables efficient multijunction solar cells and LEDs... [M2] **To achieve this**, we focus on the role of halide vacancies in anion migration... [M3] **We employ** a 3D “hollow” perovskite structure, wherein a molecule is incorporated and varies the density of hollow sites... [M4] Photoluminescent measurements **reveals that** 1% EDA can stabilize a mixed-halide perovskite under illumination... [M5] **These findings suggest that** hollow site limit the mobility of halide vacancies... //* (Abstract 42, 2023, pattern 1-2-3-4-5)

Example 11

*[M1] Metal halide perovskites are rivaling established materials for thin film photovoltaics... [M4] **We show that** the band edge energies of MAPbI₃ **can be varied** by postsynthetic chemical treatment, and... //* (Abstract 14, 2019, pattern 1-4)

Overall, reduced move configurations particularly the four-move (1-2-3-4) and three-move (1-2-4) patterns clearly predominate over the complete five-move sequence. This finding is consistent with Amnuai's (2019) analysis of high-impact scientific abstracts, which suggests that the Introduction-Purpose-Method-Result structure is common, and it extends recent evidence from biochemistry itself: Kurniawan et al. (2026), applying Hyland's (2000) five-move framework to a separate corpus of highly cited, Scopus-indexed biochemistry articles, likewise found the Method move to fall short of conventional status (53.3%) while Introduction, Purpose, Results, and Conclusion were realized more consistently a pattern that diverges from the present study chiefly in the salience of Conclusion, suggesting that even within the same discipline, move salience can shift depending on corpus composition, journal indexing criteria, and citation-based sampling. Such convergence and divergence together indicate that biochemistry abstracts, across independently compiled corpora, consistently privilege rhetorical compression over structural completeness, even though the precise moves selected for omission can vary.

The current omission of Move 5 (Conclusion) implies a disciplinary preference for reporting empirical outcomes rather than elaborating broader interpretive claims, while the frequent absence of Move 3 (Method) in three-move patterns suggests that authors rely on an assumed, shared understanding of methodological adequacy to remain within strict word limits. This behaviour is compatible with Belleza (2026) cross-context finding that Purpose, Methodology, Result, and Conclusion function as the statistically obligatory core of the IPMRC model while Introduction remains optional although, notably, the ordering of what is treated as dispensable differs between her applied-linguistics corpus and the present biochemistry data, where Introduction is comparatively well-preserved and Conclusion is the more frequently sacrificed element. Such disciplinary variation reinforces Swales (2004) contention that move conventionally is not a fixed property of a genre in the abstract, but is continually negotiated by the specific discourse community that produced and evaluates it. Even so, the abstracts in this selection remain broadly linear in their move sequencing, indicating that while individual moves may be included or excluded, the underlying structural logic of the genre background, purpose, methodology, and results, in that order remains stable.

5. CONCLUSION

This study examined the rhetorical move-step patterns of biochemistry research article abstracts published in Q1 Scopus-indexed journals, applying a top-down, and Hyland's (2000) coding scheme to trace the distribution of moves, steps, and their linguistic realization across a 100 abstract corpus. The findings show that all five rhetorical moves were realized, though with markedly uneven distribution. Move 4 (Results) was the most dominant, underscoring the corpus's overriding focus on presenting concrete empirical findings, while Move 5 (Conclusion) was the least frequently realized, appearing in fewer than a third of the abstracts. The analysis also revealed a systematic rhetorical compression at the linguistic level, most visibly where Move 3 and Move 4 are merged into a single, participially compressed sentence, alongside a clear division of task between evaluative, present-tense phrasing in the Introduction, past-tense, evidential phrasing in the Method and Result moves. Step-level findings further indicate a preference for steps that establish topic orientation and specify experimental procedure, over steps that state a research gap or offer an evaluative conclusion.

These findings show that experienced biochemistry authors do not apply the full move of conventional moves uniformly, but instead merge move and step selection together with tense and reporting-verb choice to the communicative priorities of their discourse, chiefly the rapid and unambiguous transmission of results. In relation to recent studies, the results reinforce that move conventionally is discipline-specific rather than universal, while also revealing that certain rhetorical tendencies particularly drift towards foregrounding results at the expense of extended contextualization or conclusion are increasingly visible across both hard and soft science genre in high-impact publishing. This dual contribution, framing the present corpus within its own discipline and against contemporary cross-disciplinary genre research offers a more critically grounded explanation than a single-corpus analysis could provide on its own.

Pedagogically, the findings offer practical guidance for novice and non-native English-speaking researchers preparing manuscripts for Scopus-indexed submission by presenting research contributions concisely, foregrounding findings, and using tense and reporting verbs strategically within the limited space of an abstract are shown here to be genre-consistent, convention-accepted rhetorical moves practices rather than personalized stylistic choices. While this study provides a

primary framework for biochemistry abstracts, its scope is restricted by the relatively small corpus of 100 abstracts and its focus on a single discipline, which may limit the findings generalization. Future research could address these limitations by expanding corpus size to 500 or more abstracts for accurately reflects the rhetorical differences within high-impact scientific writing. Furthermore, comparative studies should be conducted between biochemistry and other 'hard science' disciplines such as chemical engineering or pharmacology to determine if the rhetorical compression identified here is a universal convention of Q1-ranked journals or specific to the life sciences. Finally, integrating computational methods and automated genre analysis tools would allow for more efficient analysis of larger datasets and enable a deeper exploration of metadiscourse markers.

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