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A Corpus-Based Study of Writer Identities in Biology Research Articles: Clusivity and Authorial Selves

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ABSTRACT

Personal attribution plays a significant role in displaying the interaction between the authors and the readers. In this study, we examine how authors construct their identities through the use of personal pronouns. The data for the research were taken 20 research articles published in two reputable international journals: 10 research articles published in *Genome Biology*, and another 10 in *Molecular Systems Biology*. The data were analyzed with the help of WordSmith Tools 5.0 (Scott, 2008), a concordance software that can help retrieve instances of authorial references used in research articles. A qualitative analysis was also conducted to examine the clusivity and the authorial selves expressed by first-person pronouns. The results show that a total of 2,267 instances of first-person plural pronouns or 126 instances per 10,000 words were found in the corpus. Most of these personal pronouns were used exclusively to refer to the authors of the research articles and to express the identity of the authors as the recounters of the research processes and originators of research claims. The results suggest that there seems to be a tendency for research article authors, especially in biology, to show their presence in their academic writing through the use of first-person pronouns.

Keywords: *academic writing, authorial self, clusivity, concordances, writer identities.*

INTRODUCTION

The objectivity of scientific writing, especially a research article, is one of the most note-worthy aspects of the traditional conventions of scientific writings. It is commonly believed that impersonal writings indicate the collective responsibility of academic endeavor as well as the writers' open-mindedness towards other findings (Lachowicz, 1981). However, debates over this feature have been raised in recent years, arguing that the attribution of writer identities is significant in scientific prose to build interactions and social relations (Hyland, 2004, 2005, 2008).

Extensive studies dealing with writer identities in scientific texts have been conducted. There have been studies of writer identities focusing on different genres of scientific texts, such as research articles (Fløttum et al., 2006; Harwood, 2005c, 2005b; Hyland, 2001, 2002b; Işik-Taş, 2018; Kuo, 1999; Vassileva, 1998), research article abstracts (Kim, 2015; Martín Martín, 2003), research article methods sections (Harwood, 2005a; Martinez, 2005), and theses (Hyland, 2002; Isler, 2018; Karoly, 2009). There have also been a number of studies comparing academic writing in English with that in Bulgarian, French, German and Russian (Vassileva, 1998), Croatian (Basic & Veselica-Majhut, 2016), French

(Hartwell & Jacques, 2014), French, German, and Italian (Rentel, 2012), Spanish (Chávez Muňoz, 2013; Lores Sanz, 2006; Molino, 2010), and so forth. A number of studies have also focused on how writers in different disciplines construct their identities, such as in applied linguistics (Dontcheva-Navrátilová, 2013; Hryniuk, 2018) and computer science, electronic engineering, and physics (Kuo, 1999).

However, little has been done to explore how writer identities are constructed in scientific texts in biology. A number of previous researchers have dealt with texts in biology in their research; yet, they treated these texts only as part of a larger corpus from various disciplines (Hyland, 2002, 2002b; Hyland & Jiang, 2016, 2017). There has also been a study comparing biology with another discipline, i.e., medicine (Hartwell & Jacques, 2014). However, this study focuses on the syntactically linked verbs which follow personal pronouns.

Therefore, in the present research, we focus on investigating writer identities through the use of authorial references to fill this gap. Specifically, this research has two objectives: (a) describing linguistic forms used to express writer identities in research articles and (b) describing authorial selves expressed by authorial references. We hope that this study contributes to our understanding of how writers of research articles, especially in biology, construct their identities in their scientific writing, especially through the use of first-person pronouns.

LITERATURE REVIEW

The presence of authors in scientific texts, especially research articles, has been investigated by a number of researchers (Hyland, 2002; 2002b; 2003; Dontcheva-Navratilova, 2013; Martin Martin, 2003; Hryniuk, 2018; Kuo, 1999; Krapivkina, 2015; Isler, 2018). In general, they examine the forms, or the grammatical aspects, as well as the functions of first-person pronouns used in selected texts based on the criteria upon which each researcher decided.

A study that explored the grammatical aspect as well as how certain linguistic forms reveal writer identity, like what the present study examines, was conducted by Martín Martín (2003). This research compares articles written in English and those in Spanish, but this study focuses only on the abstracts of research articles. To ensure the credibility of the research and the validity of the comparison between two languages, Martín Martín (2003) used the same number of articles written in each language. A taxonomy of discourse functions of author-reference pronouns was created. Based on this exploration, Martin Martin (2003) categorized them into a) the author as the describer of the research, b) the author as the experiment-conductor, c) the author as the opinion-holder, d) the author as the cautious claim maker, and e) the author as the fully committed claim maker.

Another taxonomy that categorizes how certain linguistic forms are used to reveal writer identity was also proposed by Tang & John (1999). This research classifies authorial identities into six categories: a) I as the representative, b) I as the guide through the essay, c) I as the architect of the essay, d) I as the recounter of the research process, e) I as the opinion holder, and f) I as the originator.

This exploration was not only done with research articles. Other genres of scientific texts have also been investigated recently in terms of their use of personal pronouns in master's theses (Işler, 2018) as well as in essays written by undergraduate students (Tang & John, 1999; Hyland,2002; Károly;2009), lectures (Fortanet, 2004) and project reports (Hyland, 2005)

Işler (2018), in his research that investigates writer identities in master's theses, also examined how writers differ in expressing their identities in academic texts in terms of the writer, focusing on theses written in English by Turkish writers and non-Turkish writers from twelve different universities. Işler (2018) argues that Turkish writers used personal pronouns rather rarely compared to non-Turkish writers in their theses.

The investigation which concerns with how writers vary in constructing their identity in academic discourse was not only explored in Turkish writers. Similar studies were also applied to investigate Polish writers in comparison to native authors (Hryniuk, 2018),

There have been other studies that examine the inclusivity and exclusivity in the use of personal pronouns in research articles as well. One of the

prominent studies related to this topic is carried out by Harwood (2005c). This corpus-based research examines research articles from various fields of study: business and management, economics, science, and physics. This research focuses on how and for what purposes *I* and the inclusive and exclusive *we* are used. In this study, Harwood (2005c) argues that the use of *I* and either inclusive or exclusive *we* in recent academic writings enables the authors to create newsworthiness and novelty.

Despite the fact that first personal pronouns were broadly investigated to examine writer identities, an exploration of other pronouns was also done by Kuo (1999). In this study, Kuo focuses on the semantic references and the discourse functions of *we, our,* and *us* as the most frequently found pronouns. He classifies the semantic references of *we* into *we1, we2, we3, we4*, and *we5,* where *we1* refers merely to the writers, *we2* means writers and readers, *we3* means writers and the researchers, we4 refers to the discipline as a whole, and *we5* is ambiguous. A similar classification is also applied to the objective pronoun *us* and the possessive pronoun *our*. To investigate the discourse functions of the personal pronouns, Kuo (1999) has divided them into twelve categories: explaining what was done, proposing a theory/approach, Stating a goal or purpose, Showing results or findings, Justifying a proposition, hedging a proposition, assuming shared knowledge/goals/beliefs, seeking agreement or cooperation, showing commitment or contribution to research, comparing approaches/ viewpoints, giving a reason or indicating necessity, and expressing wish or expectation.

THEORETICAL FRAMEWORK

Ivanic (1998) argues that writer identities are constructed by a number of aspects: autobiographical self, discoursal self, self as author, and possibilities for self-hood. This concept indicates how complex the construction of writer identities is. The autobiographical self is constructed from life history in society and discourses. The discoursal self represents the identity of the writer associated with a particular text, yet maintained in the writer's identities outside the text. Possibilities for self-hood are open to socio-cultural and institutional context, and self as author, or authorial self, is the attribution of the authors to establish their presence and authority.

In constructing their identities, authors may employ a number of linguistic markers such as verbs, adverbials, pronouns, adjectives, and so forth. Among them, personal pronouns are arguably the ones that express identities in the text most overtly (Biber et al., 1999), especially with the use of first-person pronouns.

As an inclusive language, English first-person plurals do not differ in their forms when they refer to the writers and the addressee or the writers only (Filimonova, 2005). An exploration of this aspect is also done in the present research, where the clusivity of the pronouns is on the basis of whether a particular pronoun includes the addressee or excludes the addressee from the referents.

Other than first-person plural pronouns, there is also a possibility that the authors employ third-person pronouns, i.e., the writer/s, the author/s, and the researcher/s. However, it is blatant that we cannot investigate these linguistic forms in terms of their clusivity since they obviously exclude the reader or the addressee.

The categorization of authorial selves expressed through the use of authorial references in this research is based on Tang and John's (1999) taxonomy. They classify authorial selves into six categories.

Author as representative

This authorial self is understood as "a proxy for a larger group" (Tang & John, 1999), where the pronouns may represent the discourse community or even people in general.

Author as the guide through the essay

Personal pronouns which express the writers' selves as guides are possibly those which position the readers and the writers at the same time and place.

Author as the architect of the essay

Guiding means locating the readers in the same place and time in the text. However, the author, as the

architect of the essay, assumes responsibility as the one who outlines, structures and highlights the text.

Author as the recounter of the research process

Authorial references are also employed by the authors to retell the process they had gone through in conducting the research.

Author as the opinion holder

Authors may also deliver their opinion on other researchers' findings and opinions by agreeing and/or disagreeing with established statements. This is done by the role of the authors as opinion holders.

Author as the originator

As the most powerful personal attribution, pronouns that front this identity indicate claims of ownership to the content of the articles

METHODS

This research was designed to investigate how academic writers construct their identities and build interactions in research articles with other researchers in the same field of study and with readers in general. This construction of identities was observed from the use of personal pronouns as they create explicit attribution of stance (Biber et al., 1999). As a corpus-based study, this research was done with the help of a concordance software *WordSmith Tools 5.0* (Scott, 2008). The corpus consists of 20 articles: 10 articles were taken from *Genome Biology* and 10 articles from *Molecular Systems Biology*. The selection of these two journals was based on their high publication rankings in the field of agricultural and biological sciences. In 2021, *Genome Biology* was ranked third by Scimago Journal and Country Rank (https://www.scimagojr.com/journalrank.php?area=1100), with an impact factor of 17.91 in 2021, while *Molecular Systems Biology* was ranked fifth with an impact factor of 13.1 in 2021.

The selection of the research articles was made conveniently, where selected articles must meet the following criterion: the articles must be published in 2018 or, more recently, written by multiple authors, the first of whom must be a native English speaker. The time period was made in order to anticipate rapid changes in the writing style development of academic texts due to the fact that textual evolution has influenced writing style, including the ways authors attribute themselves in their writings. The choice of native English writers here was because this study does not address variation among native and non-native writers. Meanwhile, the exclusion of single-authored articles here was due to the fact that the underlying basis of using first-person plurals by an individual writer might possibly be very complex and even considered one of the authors' strategies to detach themselves from their writings (Hyland, 2002b). Table 1 below shows the total number of words in the corpus.

Table 1. Total number of words in the corpus

No.	Journal	Mean	Total
1.	Genome Biology	9,839	98,391
2.	Molecular Systems Biology	8,094	80,946
	Total	**8,967**	**179,337**

The articles were numbered from 1-20, and the journals from which the articles were taken were coded GB for *Genome Biology* and MSB for *Molecular Systems Biology*. These codes, together with the article numbers, were used in file naming. Thus, the code GB01, for instance, indicates the file name for the first article number taken from *Genome Biology*. Furthermore, only running texts were included in the corpus. Unnecessary information such as tables, figures, charts, formulas, notes, and references, was removed from the texts.

To address the linguistic forms of writer identities and the authorial selves that they express, the data, at least in the form of sentences, were examined together with the context from which they were taken. This was done through a manual analysis despite the ease of being computer-aided with the concordance software. Before the occurrences of authorial references were quantified, data sifting (Ädel, 2006) was carried out to remove unwanted instances, for example, the sentences which contained the expression *the authors* that did not refer to the authors of the article.

An exploration of the clusivity of first-person pronouns was also done to check whether they were

used inclusively or exclusively. The frequency of occurrences of first-person pronouns was calculated and normalized per 10,000 words (p10kw). This was to help the following analysis, which involved chi-square testing, in order to see if there was a significant difference in the use of first-person pronouns.

All authorial references were also categorized based on the authorial selves expressed through the use of first-person pronouns. This categorization followed the categorization formulated by Tang & John (1999) with slight modifications: (1) *authors as representatives,* (2) *authors as guides through the article*, (3) *authors as architects of the article,* (4) *authors as recounters of the research process,* (5) *authors as opinion-holders,* and (6) *authors as originators*, ordered from the least authoritative to the most authoritative writer identities respectively. Chi-square testing was also applied to the use of different pronouns to see how significant the difference in the expression of authorial selves was.

RESULTS AND DISCUSSION

Linguistic Forms of Writer Identities and their Clusivity

In the corpus, a total of 2,267 instances of first-person pronouns or 126 instances per 10,000 words were found. The first-person pronouns *our, ours, us,* and *we* were found, with the pronoun *we* being used most frequently (100 p100kw). Table 2 shows the overall frequency of first-person pronouns and their clusivity used in the corpus.

The findings of this study indicate the use of first-person pronouns as the main linguistic forms to express writer identities. These findings seem to go in line with initial studies investigating co-authored journal articles from various disciplines (Hyland, 2001; Kuo, 1999; Martín Martín, 2003). For instance, only *we, us,* and *our* were found in research articles from hard sciences (Hyland, 2001). A chi-square test was run to check whether there is any significant difference in the use of first-person pronouns in the corpus. The results show that there is indeed a very significant difference in the use of authorial references in research articles in biology ($df = 3$, $\chi 2 = 207.772$, $p < 0.001$). This significant difference might be affected by their syntactic roles, which will be discussed below.

Table 2. Frequency of linguistic forms of writer identities in the corpus

No.	Pronouns	Raw	p10kw
1.	Our	445	24.81
2.	Ours	2	0.11
3.	Us	31	1.73
4.	We	1,789	99.76
	Total	**2,267**	**126.41**

In terms of their clusivity, as Table 3 below shows, this study supports Martín Martín (2003), indicating that most first-person plurals found in the research articles are exclusive. Only 25 instances (1 p10kw) of inclusive pronouns were found. This lack of inclusive pronouns suggests that the authors of the biology research articles in this study rarely employ personal pronouns merely for involvement strategies. The subsections below discuss in more detail each of the first-person pronouns used to express authorial identities.

Table 3. Frequency of inclusive and exclusive first-person pronouns in the corpus

No.	Pronouns	Inclusive		Exclusive	
		Raw	p10kw	Raw	p10kw
1.	Our	5	0.28	440	24.53
2.	Ours	0	0	2	0.11
3.	Us	1	0.06	30	1.67
4.	We	19	1.06	1,770	98.70
	Total	**25**	**1.39**	**2,242**	**126.41**

Our

This possessive determiner is the second-most frequently used linguistic form in the corpus, with a total of 445 instances, or 25 p10kw. In terms of their clusivity, the exclusive pronoun *our* is likewise found more frequently (25 p10kw), and the inclusive form occurred five times (0.28 p10kw). As mentioned previously, this finding seems to go in line with the overall finding of this research, which is the lack of inclusivity of first-person plural pronouns.

This finding is quite similar to other studies to date (Hryniuk, 2018; Dontcheva-Navratilova, 2013;

Martin Martin, 2003; Hyland, 2001; 2002; Kuo, 1999). For example, Kuo (1999) reported that *our* was the second most frequent pronoun used in journal articles in computer science, electronic engineering, and physics. With respect to its syntactic role, this possessive pronoun was used less frequently than the nominative pronoun *we* since *our* belongs to a group of possessive determiners (Biber et al., 1999). Below are two examples illustrating the use of the exclusive *our* in the corpus.

(1) **Our** work is consistent with previous studies (Geiler-Samerotte et al, 2011; Escusa-Toret et al, 2013; Tomala et al, 2014) and provides quantitative insights as well as a framework to decouple the fitness cost and benefit of protein phase separation, and the associated loss/gain of protein function in different environments (MSB02D).

(2) Inhibition of SFKs by dasatinib led to a marked reduction of tyrosine phosphorylation sites that were upregulated by palmitate in **our** cell-based assay (MSB08D).

Example (1) shows one of the uses of exclusive *our* which is to exclusively elaborate the authors' findings in comparison with other findings. The use of the exclusive *our* is also to stress their ownership of methodology, as demonstrated by example (2).

(3) A better understanding of whether and how paralogs can compensate for each other's deleterious mutations therefore requires a better understanding of the mechanisms involved. This would improve **our** understanding of evolution and also accelerate the development of medical interventions because redundancy is often a major obstacle in this context (Lavi, 2015) (MSB09I).

Meanwhile, the use of the inclusive *our,* as illustrated in example (3), includes the readers as if they shared similar understanding on the topic under discussion. This pronominal use might be a strategy of audience positioning where the authors employ "shared knowledge" and "hearer pronouns" in their writings (Baumgarten, 2008).

Ours

This possessive pronoun occurs least frequently in the corpus, with only two (all exclusive) instances. Nevertheless, this finding is not surprising since a number of previous studies did not find any instances of this form in scientific texts (Hryniuk, 2018; Kuo, 1999; Martín Martín, 2003).

Examples (4) and (5) below show that this pronoun is always used after a previously mentioned noun phrase to which they refer. In example (4), the word *ours* refers to the authors' observations, and *ours* in example (5) refers to their results.

(4) These observations and **ours** have important consequences regarding the buffering effects of paralogs and their evolution (MSB09D).

(5) Reassuringly, their results are largely consistent with **ours**, including the higher mutation rate in female breast tissue (vs male) and in the sun-exposed skin (vs the non-sun-exposed skin) of Caucasians but not African-Americans, as well as the excess of nonsense mutations in NOTCH1 (GB06D).

Us

Compared to its nominative form, the accusative form *us* was used less frequently, with only two instances per 10,000 words. This is quite common since no occurrence was reported in a number of other studies (Carciu, 2009; Işik-Taş, 2018; Mur-Dueñas, 2007). In addition, Biber et al. (1999) also argue that accusative pronouns are commonly employed in conversations instead of academic prose.

The use of exclusive *us* here is not much different from the use of the nominative form *we,* in which the authors declare and claim that it is the work and finding of their own that they are talking about in the text, as shown in example (6) and retell the activities that they undertook in conducting the research as shown in example (7).

(6) Our data lead **us** to propose a model for MadR regulation of desA1 and desA2 transcription as summarized in Fig 6 (MSB03D).

(7) This methodology involves a very short, 20-min immunoprecipitation to limit non-specific binding of mRNA to beads. This allowed **us** to isolate endogenous mRNA protein complexes. HEK293 cells were harvested and lysed in lysis buffer (20mM Tris

pH7.5, 200mM NaCl, 5mM MgCl2, 0.5% Triton-X100, 1× protease inhibitors (Roche), 1% BSA, 0.5mM DTT, 5mM NaF, 40U/ml RiboLock (Thermo)). Lysates were spun down at 5000 rpm for 10min, and supernatants used in subsequent steps (GB07M).

We

This nominative form occurs most frequently, where the exclusive form was used 99 times, whereas the inclusive form was used only one time per 10,000 words in the corpus. This dominance is not surprising since syntactically, nominative pronouns fill the subject position (Biber et al., 1999). This finding also supports other studies (Hyland, 2001, 2002; Martín Martín, 2003) where the exclusive *we* is reported to be the most common first-person pronoun employed to express authorial identities.

The exclusive *we* mostly indicate that it is the authors themselves who carried out the study, as illustrated in example (8), or it is the authors' original works and ideas that are being demonstrated inside the text, as shown in example (9).

(8) To do so, **we** collected approximately 10 worms, washed their cuticles to remove the external bacteria, grounded the sample population using a motorized pestle, and finally estimated the content of their intestines by colony counting (Fig 3A) (MSB05R).

(9) For both gene classes, **we** find significantly more MPRA activity in promoter regions than in gene bodies (GB03A).

On the contrary, the inclusive pronouns are used to presume the readers were familiar with the related scientific discussion, as illustrated in example (10). It may indicate one of these possibilities: one possibility is that the readers were included as an involvement strategy (*pluralis auctoris*) (Du Bois, 2012), and another possibility is that it was to represent their targeted readers, who are probably academic community.

(10) For both gene classes, **we** find significantly more MPRA activity in promoter regions than in gene bodies (GB03A).

Authorial Selves in Biology Research Articles

All categories of authorial selves were expressed by the authorial references in the corpus, and most authorial references in this study are employed to express the identity of the authors as the recounters of the articles, supporting Hyland (2002), who reported a high frequency of pronouns used to explain procedures. However, this finding contradicts the finding reported by Dontcheva-Navratilova (2013), in which authorial presence in research articles published in the journals *Applied Linguistics* and *Discourse and Interaction* mostly indicates the authors' involvement with the readers. Table 4 below shows the overall frequency of authorial selves in the corpus.

Table 4. Frequency of authorial selves in the corpus

No.	Authorial Identities	raw	p10kw
1.	Architects of the article	151	8.42
2.	Guides through the article	3	0.17
3.	Opinion holders	100	5.58
4.	Originators	452	25.20
5.	Recounters of the research processes	1539	85.82
6.	Representatives	22	1.32
	Total	**2,267**	**126.41**

Chi-square testing shows that authorial selves expressed through the use of plural first-person pronouns in the corpus also indicate a significant difference ($df = 5$, $\chi2 = 260.762$, $p < 0.001$). Much more instances of authorial references were used to express the authors' identity in a relatively authoritative way, meaning that there is a possibility of raised encouragement to writers in expressing their identities. Each of the authorial selves is discussed in more detail below.

Authors as the Architects of the Article

First-person plural pronouns used to express this identity occur 8.42 times p10kw. This identity is mostly expressed by the pronoun *we* (6.8 p10kw). This finding supports the argument that in stating a goal or a purpose, which belongs to an architect's task, authors commonly employ the pronoun *we* (Kuo, 1999). Below are two examples illustrating the use of *we* to express the authors as the architects of the article.

(11) **We** demonstrate that depletion of the rG4-unwinding helicases DHX36 and DHX9 promotes translation of rG4-associated uORFs while reducing the translation of coding regions for transcripts that comprise proto-oncogenes, transcription factors and epigenetic regulators (GB01A).

(12) In this study, **we** have demonstrated that integrating quantitative analysis of survival curves with mathematical modeling allows one to determine how the dynamics governing pathogen invasion of the host lead to the different time scales associated with host mortality (MSB05D).

Example (11) indicates that the authors are the ones who organize the article by demonstrating the aforementioned facts inside the text. In example (12), the authors remind the readers of the information they discussed previously in their article.

Authors as the Guides through the Article

First-person plural pronouns which express this authorial self were used in only three instances or only 0.17 p10kw, all belonging to inclusive pronouns. This finding supports the argument that the role as a guide is commonly expressed through the use of inclusive pronouns (Harwood, 2005c). Below are two examples.

(13) However, the trend showed some dependence on molecular features such as mRNA expression levels, as **we** discuss below (MSB09R).

(14) These tumor types have been thoroughly analyzed using eight machine-learning methods, which provide extensive performance results that **we** can compare to (Yuan et al, 2014a) (MSB01R).

In example (13), the authors announce what they will discuss next inside the text, meanwhile, example (14) does not explicitly place the readers in another place inside the text. Instead, the readers are led to refer to information outside the text which supports the text.

Authors as Opinion-Holders

First-person pronouns which show this identity are commonly followed by verbs of thinking and emotions (Vassileva, 1998). Two examples are shown below.

(15) The present study provides initial discoveries of genetic influence on 3D chromatin conformation and an analytical framework that **we** believe will facilitate future efforts to unravel the molecular basis of genetic disease risk (GB08D).

(16) However, **we** suspect that no single mechanism or causal hierarchy applies to all regions of the genome with variation in one or more of these molecular phenotypes (GB08D).

Example (15) displays how the writers attribute their personal viewpoints to their own findings and, at the same time, trigger the readers to believe what the authors believe. The authors may also state their prediction, as shown in example (16).

Authors as Originators

The most authoritative writer identity in the corpus as originators was expressed through the use of first-person pronouns, occurring 25.20 times p10kw. This considerable number seems to suggest that attempts have been made to write more personal academic writing instead of keeping them too far away from subjectivity. The following three examples illustrate how this identity is expressed in biology research articles.

(17) Similarly, one of the strongest features from **our** models that predicted protection was Pol-specific antibodies binding C1q (MSB03D).

(18) **Our** data lead us to propose a model for MadR regulation of desA1 and desA2 transcription as summarized in Fig 6 (MSB06D).

(19) **We** find that when Ura3p activity is essential or toxic, on average, cells with a higher fraction of phase-separated protein are selected against (i.e., higher free protein is selected for) or for (i.e., less free protein is selected for), respectively (Fig 5D) (MSB02R).

In example (17), we can see how the authors claim their unique findings and promote them by exploring the strongest feature of their model. Example (18) shows that the person behind the accusative form *us* is the one who owns the data and originally proposes a new model. The authors also employ personal pronouns to elaborate their findings in example (19).

Authors as Recounters of the Research Process

First-person pronouns in the corpus are also used to express the self as the recounters of the research process, meaning that the authors show themselves by retelling the procedural steps they took in conducting their research. This identity was expressed 85.82 times p10kw, by far the most frequently found authorial identity in the corpus. The following are two examples.

(20) **We** selected a subset of the mRNA features that best describe the variability in mRNA features in our dataset by assessing their variances in terms of eigen values (GB01M).

(21) **We** then assessed the correlations (using a threshold of $|\text{correlation}| \leq 0.85$) and linear dependencies (using QR decomposition) in between the selected predictors and found that all selected predictors were independent (GB01M).

Examples (20) and (21) clearly show how the authors position themselves as the conductor of the experiment, step by step. These two instances are found in the same section of the research article. They explain two different phases in the experiment. Example (20) attempts to recount the process of data collection where the researchers selected the mRNA features. Meanwhile, example (21) indicates that the authors undertook an assessment in the phase of data analysis.

Authors as Representatives

22 instances of first-person pronouns (1.32 p10kw) expressed this authorial role. This finding supports Krapivkina (2015), who reported that *we* is mostly used to mark the stance of a representative in research articles.

One of the usages of this role in the instances was to seek reader involvement when claiming ideas. This supports Dontcheva-Navratilova (2013), who argues that the pronouns "position the author as a member of a larger community" (p.321). This role is well-illustrated by example (22), where the pronoun *we* here represents researchers in their academic community so that the authors may gain acceptance of their findings among other researchers in their discipline.

(22) Thus, using a single oligonucleotide **we** are able to detect a substantial fraction of copies (24.2%) from an abundant and relatively ancient TE family with a high rate of specificity (95%) (GB02R).

(23) The presence of clear enhancer activity in these loci has important implications for **our** current understanding and interpretation of lincRNA knockout models, which have been the focus of intense debate [5, 22] (GB03D).

(24) Taken together with the observation that eIF4A2-bound messages have increased ribosome occupancy in the 5′UTR compared to all mRNAs (Fig. 2f), as was seen for 5′UTRs of mRNAs sensitive to inhibition of eIF4A1 by RocA by Iwasaki et al. [37], this suggested to **us** that uninhibited eIF4A2 might be displaying similar activity to RocA-inhibited eIF4A1 (GB07R).

In examples (23) and (24), we can easily predict that our discussion will not be much different from the previous one on inclusive pronouns. This is probably why Martin Martin (2003) merged this role with inclusive pronouns, where this notion is referred to as "Inclusive A" and "Inclusive B" which represent people in general and a smaller group of people, respectively. In example (23), the authors position themselves among people in their academic community who share the same understanding of the object under discussion. This is not too distinct from example (24), in which the authors position themselves as merely part of the readers, to which their findings suggest an argument. In this sentence, they positioned their findings at a higher level than they positioned themselves as the contributor to the findings. This is probably why this notion is also mentioned as a "low-risk function of first-person pronouns" (Isik Tas, 2018, p. 447).

CONCLUSION

In the present research, we have explored the use of first-person plural pronouns *we, us, our*, and *ours* to express authorial selves. A total of 2,267 instances of first-person plural pronouns or 126 instances per 10,000 words were found in the corpus. Most of these personal pronouns were used exclusively to refer to the authors of the research articles. The high incidence of pronominal use in biology research articles seems to show that academic writing is now not purely seen as an impersonal piece writing. There seems to be a tendency for research article authors, especially in biology, to show their presence in their academic writing through the use of first-person pronouns.

In terms of the authorial selves expressed by first-person plural pronouns, we found that most pronouns were employed in order to express the identity of the authors as the recounters of the research processes and originators of research claims. This finding suggests that research article authors tend to employ first-person plural pronouns to express even more powerfully their presence in their research articles.

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