Interactional Metadiscourse in Research Article Abstracts: An Analysis from Public Health Journals

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Abstract

Research article (RA) abstracts are the first point of contact for readers of academic works seeking research in their fields. They also determine whether readers decide to read the rest of the article. For these reasons, skillfully written RA abstracts are important for novice writers who wish to enter the discourse community of their discipline. Previous studies, e.g., Chang (2016) Gillaerts and van de Velde (2010) Liu and Huang (2017) have taken a closer look by exploring interactional and interactive metadiscourse markers in RA abstracts. Key findings show that RA abstracts are likely to be persuasive endeavors with interaction between authors and readers. Although many disciplines have been subjected to this rhetorical analysis, very few studies have explored interactional and interactive metadiscourse markers in the discipline of public health. The present study addresses this gap by analyzing interactional and interactive metadiscourse markers in 60 RA abstracts within the discipline of public health. Based on Hyland (2005b) classification of stance and taxonomy of interactive metadiscourse markers (Hyland, 2005a), the findings revealed that the most frequent uses of stance were attitude markers, self-mentions, hedges and boosters, respectively. Moreover, the use of transition markers to project additive, consequential or contrastive connections were found extensively. Our findings suggest that RA abstracts are a persuasive endeavor reflecting social communication and an interaction between author and audience.

Keywords: interactional metadiscourse, interactive metadiscourse markers, public health, research article abstracts, stance

ภาษาเชิงปฏิสัมพันธ์ที่ปรากฏในบทคัดย่องานวิจัยด้านสาธารณสุขศาสตร์

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บทคัดย่อ

บทคัดย่อบทความวิจัยเป็นส่วนแรกที่ผู้อ่านงานวิจัยเลือกอ่านเพื่อตรวจสอบเนื้อหาตามความสนใจหลังจากอ่านบทคัดย่อแล้ว ผู้อ่านจะตัดสินใจอ่านส่วนที่เป็นเนื้อหาในบทความวิจัย บทคัดย่อมีความสำคัญต่อนักวิจัยรุ่นใหม่ในการก้าวเข้าสู่วงวิชาการหรือศาสตร์นั้น ๆ และการเขียนบทคัดย่อควรใช้ภาษาเพื่อให้สมาชิกในวงการวิชาการนั้น ๆ ยอมรับ นักวิจัยเช่น Chang (2016) Gillaerts and van de Velde (2010) Liu and Huang (2017) ได้ศึกษาภาษา

เชิงปฏิสัมพันธ์และตัวบ่งชี้ภาษาเชิงปฏิสัมพันธ์ที่ปรากฏในบทคัดย่อบทความวิจัยในสาขาวิชาต่าง ๆ นักวิจัยดังกล่าวพบว่า บทคัดย่อในบทความวิจัยแสดงการโน้มน้าวผ่านการปฏิสัมพันธ์ของผู้เขียนและผู้อ่าน นักวิจัยได้ศึกษาภาษาเชิงปฏิสัมพันธ์ในบทคัดย่อในหลายสาขาวิชา แต่ยังไม่ได้ศึกษาภาษาเชิงปฏิสัมพันธ์และตัวบ่งชี้ภาษาเชิงปฏิสัมพันธ์ในสาขาสาธารณสุขศาสตร์ งานวิจัยนี้มีวัตถุประสงค์ที่จะศึกษาภาษาเชิงปฏิสัมพันธ์และตัวบ่งชี้ภาษาเชิงปฏิสัมพันธ์ที่ปรากฏในบทคัดย่อบทความวิจัยในสาขาสาธารณสุขศาสตร์ การจำแนกมุมมองเชิงปฏิสัมพันธ์ของ Hyland (2005b) และการจัดหมวดหมู่ของตัวบ่งชี้ภาษาเชิงปฏิสัมพันธ์ของ Hyland (2005a) เป็นกรอบของการวิเคราะห์ ผลการศึกษาพบการใช้มุมมองเชิงปฏิสัมพันธ์ ได้แก่ การแสดงทัศนะ การอ้างถึงตัวตน การพูดออกตัวและการพูดเสริมความ ผลการศึกษายังพบการใช้คำเชื่อมเพื่อแสดงการเสริมความ การเรียงลำดับ และการเปรียบต่าง ผลการศึกษาพบว่า บทคัดย่อเป็นงานเขียนเพื่อสื่อสารทางสังคม การโน้มน้าว และการปฏิสัมพันธ์ระหว่างผู้เขียนกับผู้อ่าน ผลของการศึกษาสามารถนำไปปรับใช้สำหรับการสอนการเขียนบทคัดย่อบทความวิจัยในสาขาสาธารณสุขศาสตร์ได้

คำสำคัญ ภาษาเชิงปฏิสัมพันธ์ ตัวบ่งชี้ภาษาเชิงปฏิสัมพันธ์ สาขาสาธารณสุขศาสตร์ บทคัดย่อบทความวิจัย มุมมองเชิงปฏิสัมพันธ์

1. Introduction

The importance of a well-written abstract is undeniable, given that the abstract is one of the key sections of any research article. According to Hyland (2002), abstracts are a reader's first encounter with an article and the point at which readers decide whether to read or ignore an article. In addition, Pho (2008) mentioned that writing a good abstract is important in order that novice writers can enter the discourse community of their disciplines. Given that each discipline has its own particular discourse community, the task of the novice writer is to produce writing that is acceptable and which conforms to the expectations of the members of their disciplines including the reviewers and editors of the target journal.

Swales (1990) proposed that the study of certain types of abstracts can potentially be highly revealing of disciplinary discourse communities. Consequently, many scholars have paid attention to the abstract as a genre and have proposed patterns to analyze research article abstracts. A number of studies have examined specific disciplines as well as different cultures and findings have indicated disciplinary variation in rhetorical structure and linguistic features in the disciplines of medicine, biomedicine, engineering, physics, biology, linguistics, applied linguistics and educational technology. For example, Pho (2008) explored linguistic realization of moves and authorial stance in different abstract moves. She found that a combination of certain linguistic features such as grammatical subjects, verb tense and voice can help distinguish moves in the abstract. It seems that Pho's study aimed to enhance novice writers to anticipate particular linguistic features in composing and to distinguish each abstract move. In addition, most previous studies

in research article abstracts have focused on the disciplinary variation in the rhetorical structure of research article (RA) abstracts.

According to the ANSI (American National Standards Institute) guidelines, the abstract should outline the main aspects of a study as briefly, concisely and objectively as possible. However, some scholars point out that RA abstracts are the interaction between writers and readers. In other words, there are some linguistic features illustrating that RA abstracts contain elements of subjectivity. Previous research studies have explored interactional metadiscourse in disciplines such as humanities, social sciences, economics, architecture and natural sciences. To the best of our knowledge, no study to date has explored RA abstracts in the discipline of public health. In response to the issues discussed above, the present study explores stance and transition markers of each move in RA abstracts in the field of public health. The exploration poses the question, "How do academic authors in the discipline of public health use stance and transition markers?"

The reason for exploring the field of public health is that this field is taught in many institutions in Thailand both at the undergraduate and postgraduate levels. For example, the discipline of public health is taught at the undergraduate level in Mahidol University, Amnatcharoen Campus. Therefore, this discipline is chosen with the expectation that the result of the present study can be applied in writing classrooms. Public health learners can become aware of how experienced researchers interact with their readers. Moreover, the results could be useful for the novice postgraduate researcher. The data from RA abstracts has been collected from international journals with a high impact factor in the discipline of public health, so these RA abstracts are exemplary of the discipline's writing style.

2. Literature Review

According to Hyland (1998b), metadiscourse refers to aspects of a text which explicitly organize the discourse, engage the audience and signal the writer's attitude. In other words, it is the way that writers project themselves into their work to signal their communicative intentions. Metadiscourse is a tool that writers use to construct appropriate contexts and allude to shared disciplinary assumptions. In reference to Hyland (2005b), some researchers define writers' judgments, feelings, or viewpoints about their subject as *evaluation* Hunston and Thompson (2000), *attitude* (Halliday, 1994), *epistemic modality* (Hyland, 1998a), *appraisal* (Martin, 2000; White, 2003), *stance* (Biber & Finegan, 1989; Hyland, 1999), and *metadiscourse*

(Crismore, 1989; Hyland & Tse, 2004). In the present study, *stance* is adopted because we use Hyland's (2005b) definition of stance and Hyland's (2005a) taxonomy of interactive metadiscourse markers (IMMs).

The present study aims to explore the use of stance and transition markers used in public health academic articles. Thus, the definition and framework of stance and interactive metadiscourse markers were discussed. Previous studies relating to interactional metadiscourse in RA abstracts will be illustrated in the following section.

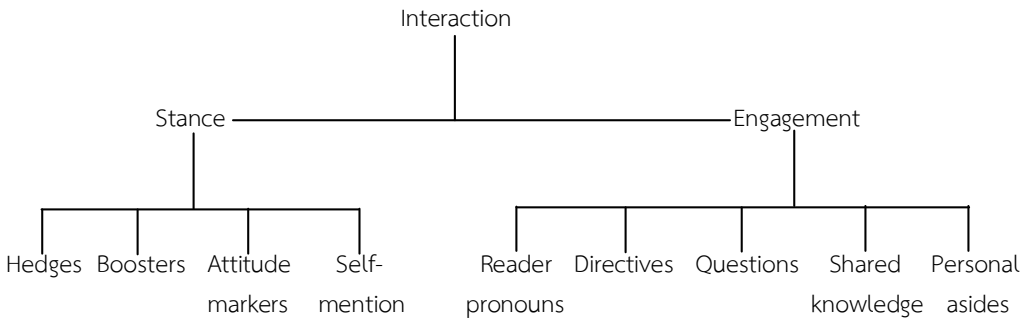
In general, stance refers to an opinion about something, especially one that is publicly expressed. However, the meaning of stance in the area of sociolinguistic and applied linguistics needs defining further. Jaffe (2009, p. 3) defines stance as follows:

> *A person's expression of their relationship to their talk (their epistemic stance—e.g., how certain they are about their assertions), and a person's expression of their relationship to their interlocutors (their interpersonal stance—e.g., friendly or dominating).Stances are thus connected both to the ways we relate to the content of our talk and to the socialness of our talk.*

Although Jaffe's focus is on the relationship of stance and sociolinguistic style, her main focus was on talk and public speaking, thus the results cannot be generalized to the writing of RA abstracts.

Academic writing has gradually come to be seen as a persuasive endeavor involving interaction between writers and readers. Such interactions are managed by stance (Hyland, 2005b). Biber (2006) also found that academic writing is deeply intertwined with subjectivity. Hyland (2005b, p. 176) defined stance as the ways writers express themselves and communicate their judgments, opinions, and commitments. "It is the way that writers intrude to stamp their personal authority onto their arguments or step back and disguise their involvement". Hyland's classification of interaction is shown in Figure 1.

Figure 1 Key resources of academic interaction (Hyland, 2005b, p. 177)



Hyland (2005b) has discussed four different types of stance: *attitude markers, boosters, hedges and self-mentions*. First, writers use *attitude markers* to signify affect, propositions, surprise, agreement, importance, and frustration. Those attitudes are not epistemic. Second, writers use *boosters* to express their certainty and to foster involvement with the topic and audience. Boosters are also used to strengthen a claim or to close off alternative voices. Third, writers use *hedges* to withhold complete commitment to a proposition and to present it as an opinion rather than accredited fact. Finally, writers use *self-mentions* via the use of first person pronouns and possessive adjectives to present propositional, affective and interpersonal information. Self-mentions are places where authors put themselves explicitly on stage.

Some scholars have pointed out that RA abstracts demonstrate interaction between writers and readers. They have found that RA abstracts contain elements of metadiscourse. Ventola (1994) mentioned that RA abstracts are a social action by nature, for they are cases of interaction between individuals, acting in social and institutional contexts. Stotesbury (2003) also found the expression of evaluation, stance and engagement in RA abstracts in the domain of humanities, social sciences, and natural sciences.

Gillaerts and Van de Velde (2010) subsequently reported on the distribution of hedges, boosters, and attitude markers in abstracts in the Journal of Pragmatics. The use of boosters was most noticeable when the intention of the abstracts was to convince the readers. However, they found that the degree of interpersonality has been reduced over 30 years. One possible reason is due to applied linguistics converging towards the hard sciences. In addition, a consequence of changing research

practices with a growing emphasis on empirical studies or a mere change in rhetorical practices is another explanation of the falling use of interpersonality.

Hu and Cao (2011) examined the use of hedges and boosters in applied linguistics abstracts published in Chinese and English journals. They found that English journals featured more hedges than Chinese journals. In addition, boosters were found more frequently in empirical research than in non-empirical research. The results also suggested that culturally preferred rhetorical strategies affected the use of hedges and boosters.

Liu and Huang (2017) explored the use of interactional metadiscourse by Chinese authors in economics research article abstracts. They found that Chinese authors used hedges and boosters to a high level and self-mentions increased substantially from 2004 to 2013. However, attitude markers were used relatively infrequently compared to other categories. The authors proposed that this reflects the interaction of deep-seated Chinese cultural learnings and Anglo-American cultural preferences.

It can be seen clearly that some scholars have explored the use of attitude markers, hedges, boosters, and self-mentions in RA abstracts in the disciplines of pragmatics, applied linguistics, economics, humanities, social sciences, and natural sciences. They have found some disciplinary variations and cultural preferences in RA abstract writing. Thus, it is interesting to explore the use of stance in various disciplines. Moreover, no previous study has explored these elements in the discipline of public health. Therefore, the present exploration poses the question about the use of stance (see Figure 1) and transition markers by academic authors in the discipline of public health. *Engagement* (see Figure 1) is not explored because Gillaerts and van de Velde (2010) have previously stated that engagement markers were virtually absent in RA abstracts. Their findings was adopted as the decision to rule out exploring engagement in the present study.

Apart from stance, *interactive metadiscourse markers* were deployed when authors wrote research articles and abstracts. Based on Hyland's (2005a) taxonomy of interactive metadiscourse markers, there are five IMMs: *transition markers*, *endophoric markers*, *frame markers*, *evidentials* and *code glosses*. First, *transition markers* aid readers to make pragmatic connections between stages in discourse development. Transition markers function to project additive, consequential or contrastive connections between ideas such as *and, furthermore, equally, in the same way, thus, therefore, however* and *in contrast.* Second, *endophoric* is a means of reinforcing discourse to

consciously enable readers to have immediate and quick access to relevant information found between parts of the text. Third, *frame markers* are used to indicate the text boundaries through labeling, sequencing, announcing and altering the direction of argument. Fourth, *evidentials* represent ideas taken from sources out of the text that helps writers to build up the authorial command of the subject and support their positioning. Finally, *code glosses* are markers that provide extra information to pave the way for readers to be acquainted with the writers' preferred meaning.

Khedri, Heng, and Ebrahimi (2013) explored the use of interactive metadiscourse markers in abstracts in the disciplines of applied linguistics and economics. They adopted Hyland's (2005a) interpersonal model of metadiscourse. They found that interactive metadiscourse markers (IMMs) were most commonly used by applied linguists. The most frequently used IMMs were transition markers, code glosses, endophoric markers and frame markers, respectively. They found that transition markers acted as the leading category in RA abstracts. The high use of IMMs suggests the strong presence of social communication embedded in research article abstracts. IMMs make the text persuasive and unfolding to a discourse community.

A pilot study was conducted to explore interactive metadiscourse markers (IMMs) and found that *transition markers* occurred frequently. The result was in line with Khedri, Heng, and Ebrahimi (2013) in that transition markers acted as the leading category in RA abstracts. Thus, the present study was conducted to explore only the use of *transition markers* which will be useful for novice writers in undergraduate and postgraduate studies.

In conclusion, to explore the elements of stance and transition markers, each move of abstracts were scrutinized word by word. In this way, all of the elements of stance and transition markers that appeared in each move were collected. The comparison of occurrences in each of the moves was then interpreted. This study did not use any software to scrutinize the data.

3. Methodology

3.1 The Construction of the Corpus

The present study aims to explore the most recent work conducted in the field of public health, so the time scale is 2016-2017. According to Nwogu (1991), three criteria should be employed in the selection of the data: representativeness, reputation, and accessibility. From these criteria a corpus of 60 research articles was compiled from three journals in the field of public health published between the

years 2016-2017. The expectation is to use the results as a pedagogical tool in a research writing classroom for public health students, so the recentness of data is an important focus.

The three journals that were chosen have high impact factors according to Clarivate Analytic (2016). Of the journals selected, 20 articles were selected from *Population Health Metrics*, 20 from *Environmental Health Perspectives*, and 20 from the *Journal of Epidemiology*, thus making a total of 60 research article abstracts. These were all empirical research articles with the conventional section format of Introduction-Method-Result-Discussion (I-M-R-D). If any of the selected papers were conceptual or theoretical, the RA abstracts would be missing Method or Result Moves, therefore they were excluded. This matter is not within the aim of the present study which explores the use of stance and transition markers of all moves of RA abstracts. The details of the corpus are presented below in Table 1.

Table 1 Description of RA abstracts corpus

Journals / Detail of RA abstracts	**Population Health Metrics**	**Environmental Health Perspectives**	**Journal of Epidemiology**
No. of RA abstracts	20	20	20
Length of RA abstracts (range of words)	197-396	224-336	199-256
Total number of words of RA abstracts	6,561	5,909	4,713
Journal Impact Factor	2.910	9.776	2.447

- *Discipline*: Public Health
- *Number of RA abstracts*: 60 RA abstracts (20 from each journal)
- *Year of publication*: all articles were published between 2016-2017
- *Journals*: The three journals in the discipline of public health have high impact factors according to *InCites Journal Citation Reports* (2016)
- *Nationality of research articles' authors:* American, British, Japanese, Spanish, Swedish, French, Dutch, Belgian, Chinese, Brazilian, Korean, Norwegian, South African, Italian, Canadian, German, Finnish, Malaysian, Burmese, Australian, Russian, Bhutanese, Surinamese, Pakistani and Kenyan

3.2 The Process of Analysis

3.2.1 Read through each of the RA abstracts and identify the moves that are used: Background and Objective Moves, Method Moves, Result Moves and Conclusion Moves, respectively.

3.2.2 Collect and take note of stance and transition markers found in each move.

3.2.3 Compare and contrast the results of each move.

3.2.4 Interpret the findings.

4. Findings

RA abstracts from the *Population Health Metrics* and the *Journal of Epidemiology* consist of four parts: Background, Methods, Results and Conclusion, while RA abstracts from *Environment Health Perspectives* contain five parts: Background, Objectives, Methods, Results and Conclusions. Therefore, the authors who submitted their research articles to these three journals followed the pattern of RA abstracts. To systematically analyze the RA abstracts from *Environment Health Perspective,* the Background and Objectives aspects were put together. Swales (1990) proposed and developed the concept of a *move* as a structural segment that has a specific communicative function and purpose. Each part of RA abstracts will be called a 'move' as Swales has described. The definition of moves of RA abstracts in the present study will adopt Hyland's (2000) classification of rhetorical moves in article abstracts.

Table 2 A classification of rhetorical moves in article abstracts (Hyland, 2000, p. 67)

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

4.1 Background/Objective Move

Background/Objective Move functions to establish the context of the paper and the motivation of the research or discussion. In addition, it is the area in which authors indicate the purpose, thesis or hypothesis, as well as outlining intention behind the paper (Hyland, 2000). This move provides information about the background and objectives of the research work. The uses of stance found in this move are shown as follows:

Table 3 The use of each type of stance in Background/Objective Move

Moves	Attitude Markers	Boosters	Hedges	Self-Mention
Background/Objective Move	48* (80%)	3 (5%)	16 (27%)	29 (48%)

* Number of authors using each type of stance

4.1.1 Attitude Markers

From a manual examination of the elements of stance, it was found that the authors used four types of stance. A total of 48 out of 60 authors (80%) used attitude markers, the most frequently used. Most authors used adjectives showing necessity or significance to emphasize the importance of their research work. For instance:

Example 1

High temperatures have ***substantial*** impacts on mortality and, … (EHP 17)

Example 2

Prostate cancer is the sixth ***leading*** cause of cancer-related deaths in Japan. (JE 13)

Example 3

…, it is ***crucial*** to increase the understanding of situation… (PHM 2)

4.1.2 Boosters

Authors used boosters to show certainty, relevance and solidarity with their readers. It was found that three authors (5%) used boosters. These authors emphasized the urgency or relevance of their work in the form of sentences or adverbs. For example:

Example 4

Worldwide, ***there is concern that*** increases in the prevalence of dementia... (EHP 13)

Example 5

Currently there are two main sources of mortality data ... (PHM 6)

4.1.3 Hedges

Hedges were used by 16 authors (27%) in the first move. To withhold complete commitment to a proposition, authors used verbs or auxiliary verbs to convey probability. Boosters help reduce the strength of a claim. For instance:

Example 6

Lot quality assurance sampling ***may*** be a suitable method of ... (PHM 9)

Example 7

The timing of poverty also ***seems to be*** important for childhood outcomes. (JE 7)

4.1.4 Self-Mentions

It was found that 29 out of 60 authors (48%) used self-mentions in the Background/Objective Move. Subject pronoun and possessive adjectives were used to project the presence of authors in their research study. For example:

Example 8

We previously described the effect of the duration if time... (PHM 10)

Example 9

Our goal was to further evaluate the higher metal ... (EHP 2)

In short, the most frequent uses of stance in this move are attitude markers and self-mentions, respectively. The authors use the above elements to initiate and emphasize the research context including projecting their own presence in their work.

4.2 Method Moves

Method moves provide the details about design, procedures, assumptions, approaches, and types of data sought (Hyland, 2000). Pho (2008) reported that first-person pronouns were infrequently found in the Describing the Methodology (DTM)

move in the corpus of applied linguistics and educational technology. However, 52 percent of authors in public health used self-mentions in Method Moves. For example:

Table 4 The use of each type of stance in Method Moves

Moves	Attitude Markers	Boosters	Hedges	Self-Mention
Method Moves	-	-	-	31* (52%)

* Number of authors using each type of stance

4.2.1 Self-Mentions

None of the authors used attitude markers, boosters, and hedges when they wrote about methodology. However, half of the authors (52%) used self-mentions to explain the methods in their study. The authors used a subject pronoun to project their presence in Method Moves. For instance:

Example 10

We analyzed trends in the population-weighted variance of life expectancy … (PHM 1)

Example 11

We compared POP levels in ever-smokers and never-smokers … (JE 9)

Example 12

We compared geometric mean levels of these five metal … (EHP 2)

The results illustrate the disciplinary variation in RA abstracts because in the discipline of applied linguistics and education technology the presence of authors seems less prevalent. Projecting authors' presence in research work may therefore be a preference for public health authors.

4.3 Result/Product Moves

The Product Move provides the main findings or results, the argument, or what was accomplished in the research (Hyland, 2000). This is the area that authors use for reporting what they have found.

Table 5 The use of each type of stance in Result Moves

Moves	Attitude Markers	Boosters	Hedges	Self-Mention
Result Moves	35* (58%)	-	5 (8%)	17 (28%)

* Number of authors using each type of stance

4.3.1 Attitude Markers

Attitude markers were used in Result Moves by 35 (58%) of authors. Authors used adverbs to convey their point of view as follows:

Example 13

In addition, trans-monachlordane in OCPs as well as PCBs was ***significantly positively*** related... (JE 9)

Example 14

Europe contributed ***substantially*** (~30%) to the overall estimate of attributable mortality. (EHP 19)

4.3.2 Hedges

Hedges were present to a small extent in this part, with just five authors (8%) making use of hedges in this move. The authors used verbs or adverbs to withhold or mitigate their findings.

Example 15

Both THPs and VDs ***could be*** successful interviewers;... (PHM 6)

Example 16

Denture wearers were ***less likely*** than dentate residents to have oral/dental ... (PHM 14)

4.3.3 Self-Mentions

Out of 60 authors, 17 (28%) used self-mentions in this move with subject pronouns and possessive adjectives to reveal the authors' presence.

Example 17

In ***our*** case-control study, late menarche was negatively... (JE 3)

Example 18

We detected associations for tetralogy ... (EHP 8)

4.4 Conclusion Moves

Conclusion Moves provide information for the interpretation or extension of the results beyond the scope of the paper, drawing inferences and pointing to applications or wider implications (Hyland, 2000). This part is rich of stance as follows:

Table 6 The use of each type of stance in Conclusion Moves

Moves	Attitude Markers	Boosters	Hedges	Self-Mention
Conclusion Moves	31* (52%)	6 (10%)	30 (50%)	18 (30%)

* Number of authors using each type of stance

4.4.1 Attitude Markers

31 authors (52%) used attitude markers in their Conclusion Moves. The authors chose adjectives emphasizing the importance and necessity of the application of their findings to show their point of view. For instance:

Example 19

Accurately measuring the physical availability of alcohol is ***critical*** for understanding the causes... (PHM 3)

Example 20

$PM_{2.5}$ released from vegetation fires is a ***notable*** risk factor for public health in Europe. (EHP 19)

Example 21

The FFQ is a ***useful*** instrument, regardless of NVP... (JE 4)

4.4.2 Boosters

Six authors (10%) used boosters in the Conclusion Moves. These authors used verbs and verb phrases to strengthen their claims and some strong booster moves also closed off alternative voices as follows:

Example 22

Furthermore, this study ***sheds light on*** other gaps in diabetes... (PHM 16)

Example 23

We ***confirmed that*** estimated dietary intake of arsenic ... (EHP 3)

4.4.3 Hedges

Half of the authors (50%) used hedges in their conclusion, the largest number of any move using hedges. Hedges convey the degree of confidence in the application of the research and appear in the form of verbs, verb phrases and adverbs to reduce the strength of research application.

Example 24

... and lack of breastfeeding ***appear to increase*** risk of both ... (JE 3)

Example 25

Moreover, the risk ***can be expected to increase*** in the future as climate change proceeds. (EHP 19)

Example 26

... it is accepted that probability of a correct diagnosis is ***likely to decline*** month by month during this period. (PHM 11)

4.4.4 Self-Mentions

18 authors (30%) used self-mentions in the Conclusion Moves. Pronoun and possessive adjectives were used to express the authors' presence. For example:

Example 27

We provide the overview of patients prostate cancer ... (JE 13)

Example 28

Our assessment suggests that air pollution ... (EHP 19)

In short, the authors in the discipline of public health used a variety of stances in Background/Objective Moves and Conclusion Moves. This preference may be derived from the nature of moves. These are the areas in which authors have a chance to illustrate their attitudes, points of view and presence.

4.5 Transition Markers

Transition markers function to project addition, consequence and contrast such as *and, furthermore, equally, in the same way, thus, therefore, however and in contrast.* Previous studies have found frequent use of transition markers in RA abstracts. The pilot part of the present study also found the extensive use of transition markers. Thus, transition markers were explored further.

Thirty one authors (52%) added transition markers in their abstracts to facilitate the readability of the text for the readership. The most widely used instances are shown in Table 7.

Table 7 The use of transition markers in all four moves

Moves	**Transition Markers**		
Background and Objective Moves	Moreover (1*) However (8) Hence (1) Despite (1)	Similarly (1) On the other hand (1) Unlike (1)	Thus (1) Therefore (1)
Method Moves	Subsequently (1) Furthermore (3)	In addition (3) Then (1)	Further (1) Additionally (1)
Result Moves	In particular (1) Besides (1) Overall (1) In contrast (2)	Consequently (1) Similarly (2) On the other hand (2) In addition (1)	However (2) In general (1) Moreover (1)
Conclusion Moves	Despite (1) However (3)	Furthermore (1) Overall (1)	Therefore (1) Moreover (1)

(*) refers to the number of occurrences.

Example 29

Moreover, the pattern of divergence appears to be driven in part … (PHM 1)

Example 30

On the other hand, the adjusted RRs for PD (CPI scores of 3 or 4) in men …(JE 6)

Example 31

Subsequently, interviews were conducted among 12 interviewers, … (PHM 6)

From the findings, it can be seen that the authors used transition markers to project additive, consequential or contrastive connections, and used them extensively in Background/Objective Moves, Method Moves, Result Moves, and Conclusion Moves.

5. Conclusion and Discussion

In the previous section, the results and examples were discussed from Background/Objectives Moves, Method Moves, Results Moves and Conclusion Moves.

The following section will point out the similarities and differences among each stance. The summary and interpretation of the findings are discussed as follows:

Table 8 The summary of each type of stance in all four moves

Moves	Attitude Markers	Boosters	Hedges	Self-Mentions
Background / Objective Moves	48* (80%)	3 (5%)	16 (27%)	29 (48%)
Method Moves	-	-	-	31 (52%)
Result Moves	35 (58%)	-	5 (8%)	17 (28%)
Conclusion Moves	31 (52%)	6 (10%)	30 (50%)	18 (30%)

* Number of authors using each type of stance

Firstly, attitude markers were found most frequently when used in Background/ Objective Moves (80%), in Result Moves (58%), and in Conclusion Moves (52%), respectively. The findings suggest that public health authors are likely to insert their attitudes in these three moves and have chances to present their direct empirical propositions in these moves.

Second, public health authors rarely used boosters in abstract writing, with boosters being at a relatively low frequency. Boosters were found in 10% of Conclusion Moves and 5% of Background/Objective Moves, respectively. Boosters are used when authors would like to strengthen their claims and close off other opinions. These findings suggest that public health authors tend to be open and are welcome to other opinions or attitudes. It is logical that if the frequency of use of boosters is low, the use of hedges should be more frequent.

Third, half of the authors used hedges in Conclusion Moves (50%), while few authors used hedges in Background and Objectives Moves (27%). It is plausible that authors may wish to limit their interpretations and implications or make them less strong in the Conclusion Moves. In other words, the authors may welcome or be open to other interpretations. The use of hedges is a strategy to allow authors to open discursive space where readers can dispute the interpretations. Hedges are the channel to involve readers as participants in their ratifications, conveying deference, modesty, or respect for the views of colleagues (Hyland, 2005b). Another plausible

explanation is that the research context covers particular areas, so applications of findings will be limited. Using hedges is a strategic tool to protect the disputation. It seems plausible that if the use of hedges is quite high, the use of boosters would be rather low.

Finally, half of the authors (52%) used self-mentions in the Method Moves and 48% of authors used them in the Background/Objective Moves. Some authors used them in the Conclusion Moves (30%) and the Result Moves (28%). These authors, all scholars in the field of public health, seem to use self-mentions extensively in their RA abstracts. The findings suggest that the authors are seeking to project themselves and how they stand in relation to their arguments, their disciplines, and their readers. The authors may be likely to emphasize their own contribution to the discipline and seek agreement for it. In the present corpus, the plural pronoun 'we' and 'our' were found, and it was subsequently verified that the number of authors varied between 1 and 36 researchers. A closer look at the use of self-mentions in single-author abstracts from the public health data found no use of the self-mention 'I'. However, Suntara and Usaha (2013) found the first-person pronoun 'I' was used in single-author abstracts in linguistics and applied linguistics. The nature of public health research lends itself to groups of researchers, while linguistics and applied linguistics can be done by single researchers. The finding illustrates noticeable disciplinary variation.

The most frequent uses of stance in the discipline of public health were attitude markers and self-mentions, respectively. Hyland (1998b), in comparison, found that hedges were the most frequently occurring feature in the disciplines of biology, applied linguistics and marketing. Gillaerts and van de Velde (2010) subsequently found boosters were the most outstanding stance used in the Journal of Pragmatics, a soft science, while Hu and Cao (2011) found that in the field of applied linguistics boosters were more frequent in empirical research than in non-empirical research. Chang (2016) also found hedges were used frequently in the field of architecture. Liu and Huang (2017) found that Chinese authors in the field of economics used hedges and boosters at a higher level than others. These findings suggest that rhetorical variation among disciplinary communities is to be expected.

The field of public health is categorized in the area of hard-applied. It is the science and art of preventing disease, prolonging life and promoting human health through organized efforts and informed choices of society, organizations, public and private, communities and individuals. The nature of this discipline may support the

high frequency of use of attitude markers and self-mentions. The context of the research is conducted in particular areas, so this characteristic enhances the use of attitude markers and self-mentions. These findings suggest that research article abstracts are seen as a persuasive endeavor providing an interaction between writers and readers (Hyland, 2005b). The uses of stance indicate that the authors present themselves through the use of self-mentions. The authors also convey their judgments, opinions, and commitments via attitude markers. Moreover, the authors stamp their personal authority through the uses of boosters. Then the authors step back and disguise their involvement via the uses of hedges.

It is noticeable that the authors do not use attitude markers, boosters and hedges when they discuss the methodology. It may be assumed that the methodology sections are intended to present an objective point of view. Elsewhere, however, stances were found throughout RA abstracts as a means of facilitating communication, supporting the author's position and building a relationship with the audience.

Half of these authors used transition markers for signaling the need for making internal cognitive connections in the discourse. The transition markers for addition, consequence and contrast were extensively employed which illustrated the authors' endeavor to make the RA abstracts persuasive and socially engaging.

The findings of the study demonstrate that RA abstracts are a form of social communication, persuasive endeavor, and interaction between authors and audiences. Hyland (1998b, p. 447) also mentioned that "metadiscourse is a universal feature of professional rhetorical writing in English". The findings could be used as a pedagogical tool to indicate that RA abstracts are not written concisely and objectively. Teachers could suggest to students that using four types of stance and transition markers in writing research article abstracts are characteristics of professional writers as well as members of their respective disciplines.

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