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Comparative Analysis of Epistemic Modal Verbs in the Three Sub-corpora of Humanities & Social Sciences *

Beşeri ve Sosyal Bilimlerin Üç Alt Derlemindeki Bilgi Kip Belirteçlerinin Karşılaştırmalı Analizi*

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Abstract

In this study, the use of epistemic modality in the category of modal verbs was comparatively examined in the abstract and introduction sections of journal articles written in the discipline of Humanities & Social Sciences. For this purpose, the Corpus of Journal Articles (CJA) 2014, which is a collection of 760 articles from high-impact journals in 38 disciplines, was used. The Humanities & Social Sciences, within this Corpus, consists of 23 sub-disciplines. The articles written in the discipline of Humanities & Social Sciences have further been divided into three sub-corpora: Research articles, Review articles and Theoretical articles. The CJA 2014 corpus consists of 6,015,063 words in total. This study investigated in quantitative terms the frequency analysis of the modal verbs "could, may, might, should, will, would, couldn't, wouldn't, shouldn't" for the above-stated three sub-corpora in the Humanities & Social Sciences discipline. Log-likelihood tests were performed to determine any significant differences among the three sub-corpora. Findings of the study indicated that the most frequently used modal verbs in both the abstract and introduction sections of the Research Articles sub-corpus are "may, will, should, could"; while the most frequently used modal verbs in the Theoretical sub-corpus are "would, will, may, should". Lastly, the most frequently used modal verbs in the Review Articles sub-corpus are "may, will, should". Qualitative examples from the corpora were also provided in the manuscript. This study is expected to have important implications for academic writing in English for different research disciplines and different types of articles.

Key Words: Academic writing, epistemic modality, modal verbs, journal articles, research disciplines.

Özet

Bu çalışmada, Beşerî Bilimler ve Sosyal Bilimler disiplinlerinde yazılan dergi makalelerinin özet ve giriş bölümlerinde bilgi kip belirteçlerinin kip fiiller kategorisinde kullanımı karşılaştırmalı olarak incelenmiştir. Bu amaçla, 38 disiplinde yüksek etkili dergilerden 760 makalenin yer aldığı Dergi Makaleleri Derlemi (CJA) 2014 kullanılmıştır. Bu Derlem içerisinde yer alan Beşerî Bilimler ve Sosyal Bilimler 23 alt disiplinden oluşmaktadır. Beşerî ve Sosyal Bilimler disiplinlerinde yazılan makaleler ayrıca üç alt gruba ayrılmıştır: Araştırma makaleleri, Derleme makaleleri ve Teorik makaleler. CJA 2014 derlemi toplamda 6.015.063 sözcükten oluşmaktadır. Bu çalışma, Beşerî Bilimler ve Sosyal Bilimler disiplinlerinde yukarıda belirtilen üç alt derlem için "could, may, might, should, will, would, couldn't, wouldn't, shouldn't" kip fiillerinin frekans analizini araştırmıştır. Üç alt grup arasında anlamlı bir farklılık olup olmadığını belirlemek için log-likelihood olasılık testleri yapılmıştır. Araştırmanın bulguları, Araştırma Makaleleri alt derleminin hem özet hem de giriş bölümlerinde en sık kullanılan kip fiillerin "may, will, should, could"; Teorik Makaleler alt derleminde en sık kullanılan kip fiillerin ise "would, will, may, should" olduğunu göstermiştir. Son olarak, Derleme Makaleleri alt derleminde en sık kullanılan kip fiiller ise "may, will, should" şeklindedir. Manuel analizler kapsamında alt derlemlerden seçilen nitel örnekler de çalışmada verilmiştir. Bu çalışmanın, farklı araştırma disiplinleri ve farklı makale türleri için İngilizce akademik yazma bağlamında önemli çıkarımlara sahip olması beklenmektedir.

Anahtar Kelimeler: Akademik yazma, bilgi kip belirteçleri, kip fiiller, dergi makaleleri, araştırma disiplinleri.

** This study is an expanded version of the paper which was orally presented in the ULEAD 2020/21 Annual Congress (15th International Congress of Research in Education) between 26-28 November 2021.*

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I. Introduction

The necessary information about the way language is used by the writers of different genres and the specific choices made by these writers for their transmission of knowledge is very important. The term used for this is metadiscourse and according to Hyland (2005a), metadiscourse is not solely information exchange but it also covers exchange of attitudes, personalities and presumptions. Thus, writers or speakers prefer to use different structures in order to express their ideas, show their stance and the way in which they interact with their potential readers. Writers use some specific markers or signals to express particular functions of language when engaging with their readers. In this respect, they display their choices about the effect which they intend to have on their readers by using these markers and signals (Dogan & Akbas, 2021).

Previous research in written academic texts such as research articles and theses demonstrated that writers' level of commitment, emotions and evaluation towards their propositions have been an interesting area to study since they have important implications for the teaching and learning of academic writing (Brown & Levinson, 1987 ; Varttala, 2001; Gray and Biber, 2014; Akbaş, 2014; Akbaş & Hardman, 2018; Vassileva,2001) Since academic writing has its own peculiar linguistic features, researchers in the area of academic discourse have focused on the specific language of different genres of writing in the past few decades (Ngula, 2017). To this end, undergraduate academic essays (McEnery and Kifle 2002; Baker and Chen 2010) and the postgraduate theses or dissertations (Charles 2006; Samraj 2008) have been investigated. However, exploring professional and expert writing genres, especially the research articles (RA) have become very popular since articles are known to be a very important channel for communicating new knowledge (Ngula, 2017). According to Hewings (2001), the most important function of research articles is to convey claims of new knowledge.

Following the studies on research articles conducted by Swales (1990), further studies have been conducted on the linguistic and textual rhetorical features of research articles (Hyland, 2002; Martinéz, 2005; Basturkmen, 2012). Many of these studies have focused on how non-native academics use rhetorical patterns and features in their English academic writing and to what extent their rhetorical patterns and choices conform to the expected discourse community norms (Mauranen, 1993; Chovanec, 2012). Results of these studies proved some important evidence that suggest non-native English-speaking (NNES) writers often overuse, underuse or misuse some certain linguistic and rhetorical devices in their academic writing and that they do not conform to the expected rhetorical practices of Anglo-American rhetorical norms (Martinéz, 2005; Leki, Cumming and Silva, 2008). Thus, in the teaching of academic writing, communicative functions of specific linguistic features should be taught to support the content of the writing (Dogan & Akbas, 2021).

The aim of this study is to investigate the use of epistemic modality in the category of modal verbs in the journal articles written in the discipline of Humanities & Social Sciences and to explore the relative frequency of epistemic modal verbs in the discipline of Humanities & Social Sciences with respect to the overall incidence of epistemic modal verbs in each of the three sub-corpora: Research articles, Review articles and Theoretical articles. Another aim of the study is to explore professional academic writers' versatility and overall rhetorical awareness with regards to the use of epistemic modal verbs for academic argumentation in the three sub-corpora. In line with these aims, this study will address two main research questions as follows:

1. What is the relative frequency of epistemic modal verbs in the discipline of Humanities & Social Sciences with respect to the overall incidence of epistemic modal verbs in each of the three sub-corpora?: Research articles, Review articles and Theoretical articles.

2. Is there meaningful difference among the 3 different types of articles in terms of epistemic modal verb use?

2. Literature Review

2.1.The Importance of Epistemic Modality in Academic Writing

According to Vold (2006), the reliability of the information conveyed is the domain of epistemic modality and the markers of epistemic modality can be considered as linguistic expressions that qualify the truth value of a propositional content explicitly. Through the use of epistemic modality, the evidence available to a writer or speaker determines the level of confidence that supports an assertion or proposition (Ngula, 2017). A variety of linguistic devices are used in order to express epistemic modality, such as modal verbs (*may, would, could, must)*; adjectives (e.g., *possible, likely*), adverbs (e.g., *possibly, perhaps*), lexical verbs (e.g., *seem, appear*), nouns (e.g., *hope, chance*), phrases and clauses (Biber et al. 1999). In this study, epistemic modal verbs are selected for analysis.

Systemic Functional Linguistics (SFL) states that epistemic modality concerns the interpersonal aspect of the three functional components of human language: ideational, interpersonal, textual (Halliday, 1994). According to Flowerdew (1998), the interpersonal function of epistemic modality is related with the writer's attitude toward the message and this is mostly realized by the use of modal verbs. Since interpersonal rhetorical features are important in academic writing, researchers have recently been interested in how academic writers use these features of interaction to persuade their readers. Epistemic modal verbs are commonly used to moderate or strengthen research claims (Ngula, 2017).

In academic community, the aim of writers is not just merely reporting their ideas to their potential readers but also interacting effectively with readers since these readers are also potential members of the writer's discourse community (Hyland 1998, 2004). As Hyland (2004) emphasizes, the effort by writers to negotiate meaning with their readers is very important as writers convey their credibility by establishing a professional and appropriate attitude to their argument. This obviously shows us that the familiarity of writers with the disciplinary practices and common language patterns in one's disciplinary field is important. Achieving these conventional practices is a significant step towards being accepted as a credible writer in that specific disciplinary community (Ngula, 2017).

2.2.Previous Studies on Epistemic Modality

Most previous research has been conducted on the use of rhetorical features and linguistic devices in research articles (RAs) written in English by non-native writers. Researchers from Europe, Asia, the Middle East, and Africa have attempted to explore this issue in order to understand the rhetorical practices of non-native writers in these regions.

The main focus of these studies has been to explore how NNES professional writers cope with the challenges of writing in a correct and proficient way in English. Another important focus of these studies has been to understand to what extent writers are aware of the conventional rhetorical features of academic writing in specific disciplines and to what extent they apply these practices in their own professional writing (Hyland 1995; Uzuner, 2008). Since English is still the leading language of academics throughout the world today, writers from non-English speaking countries try to achieve the rhetorical requirements of English in their own disciplinary field. Results of many studies demonstrate that epistemic rhetorical devices used by NNES writers do not meet the expected standard conventions of the academic discourse communities concerned (Panacová, 2008; Ngula, 2017; Mirahayuni, 2002; He and Wang 2013).

Other previous studies of epistemic modality have been conducted across a wide range of academic disciplines and these studies have involved the analysis of particular markers of epistemic modality using different frameworks and approaches. For example, Yang et al. (2015) examined medical research articles. Their data were composed of 25 English-medium medical research articles written by native speakers A systematic functional perspective was adopted in the study. The results showed that "writers tend to use low or median value epistemic modal expressions and epistemic modal expressions with implicitly subjective/objective or explicitly objective orientations" (Yang et al., 2015: 9). This finding indicated that native-speaker medical research writers exhibited a tentative and objective manner when making their claims and they refrained from being subjective. By adapting the frameworks of Hyland (2005a; 2005b) and Biber (2006), Poole et al. (2019) investigated the epistemic stance in the corpus of biochemical research. There were research articles written between 1971 and 2017 within the corpus and they divided into five time periods. Results of the study showed that the frequencies of 'can' and 'will', increased over time and these two modals express the highest commitment and certainty. Also, these two core modals had higher fluctuations than the modals 'would', 'should' and 'might'. Another recent study by Doğan&Akbaş (2021) investigated the epistemic stance in medical research articles. Researchers aimed to explore how the writers of these articles convey their degree of certainty towards their propositions by using modal auxiliaries, hedges and boosters in the results and discussion sections of their articles. Results of the study demonstrated that there was very frequent use of modal auxiliaries by the writers in the field of medicine to express modality. Another finding was that medical researchers did not use a greater number of boosters to amplify their commitment toward their propositions.

In line with the findings of these previous studies, the current study was designed to investigate the use of epistemic modality within the category of modal verbs in the abstract and introduction sections of journal articles written in the discipline of Humanities & Social Sciences with an aim to explore the professional academic writers' versatility and overall rhetorical awareness with regards to the use of epistemic modal verbs for academic argumentation.

3. Corpora and Methodology

In this study, the use of epistemic modality in the category of modal verbs has been comparatively examined in the abstract and introduction sections of journal articles written in the discipline of Humanities & Social Sciences. For this purpose, the Corpus of Journal Articles (CJA) 2014, which is a collection of 760 articles from high-impact journals in 38 disciplines, has been used. The Humanities & Social Sciences, within this Corpus, consists of 23 sub-disciplines. The articles written in the discipline of Humanities & Social Sciences have further been divided into three sub-corpora: Research articles (RA), Review articles (RVA) and Theoretical articles (TA). The CJA 2014 corpus consists of 6,015,063 words in total.

This study did not focus on whether the authors writing these articles were native speakers of English or not. This kind of distinction was not made among the authors in the corpora. Instead, the focus was on the different types of articles: Research articles, Review articles and Theoretical articles. The main aim was to explore whether there are differences among these different types of articles in terms of epistemic modality usage. Much of previous research on epistemic modality has focused on the native/ non-native and professional/novice writers distinction. As far as I know, there is not much research regarding the different types of articles in terms of epistemic modality usage. The present study therefore aims to fill this gap. All of the articles used in this study were selected from the discipline of Humanities & Social Sciences of (CJA) 2014. The reason of investigating only the abstract and introduction sections of these articles was because these two sections were jointly included in these three types of articles.

Table 1 shows the disciplines included in the Humanities and Social Sciences.

Table 1. Disciplines included in the Humanities & Social Sciences

	Humanities and Social Sciences
1	Accounting and Finance
2	Anthropology
3	Applied Social Sciences
4	Archaeology
5	Building and Real Estate
6	Communication
7	Design
8	Economics
9	Education
10	Geography
11	History
12	History of Art
13	Hotel and Tourism Management
14	Law

15	Linguistics
16	Literature
17	Logistics
18	Management and Marketing
19	Music
20	Philosophy
21	Politics
22	Psychology
23	Sociology

While searching for epistemic modal verbs in the three sub-corpora of research articles (RAs), I started by consulting previous studies (Hyland and Milton, 1997; Rizomilioti, 2006) to determine a list of modal verbs with potential epistemic value. A total of 10 forms were derived: *could, couldn't, may, might, must, should, shouldn't, would, wouldn't, will.* The forms *can* and *can't/cannot* were not included for analysis because they rarely occur epistemically and they have not been previously listed as epistemic forms (see i.e. Coates, 1983; Collins, 2009).

Since modal verbs have both deontic (Deontic refers to basic meaning) and epistemic meanings, this difference was also taken into account during the contextual and manual analyses. The concordance lines for each occurring modal were closely examined to determine epistemic uses over non-epistemic ones. This close reading of concordance lines is crucial because modal verbs in context could be performing other functions apart from epistemic meanings. Therefore, non-epistemic uses were deleted and genuine epistemic cases were recorded. Deontic functions were not included in the analysis, as illustrated in Sentence (1) below:

(1) This article *will* also analyze how the first (or native) culture sets this group apart from heritage language learners. (RA, 8463435)

Will in the above example taken from the Research Articles (RA) sub-corpus is used as deontic modality because it is related to the volition. Volition includes intention and willingness. This volition is much related to the futurity. This instance can be given as an example of deontic modality. Instances like this one were therefore excluded from the data analyses procedure.

Another instance, which is also excluded from the analysis, is provided in Sentence (2) below:

(2) In this research, participants nominated up to four people they *would* seek out to help them regulate their emotions across seven different emotional domains (e.g., cheering up when sad, calming down when anxious). (TA, 4186447)

Would in the above example taken from the Theoretical Articles (TA) sub-corpus is also used as deontic modality because it is used as the past tense of *will* and this usage refers to past prediction or past futurity. This instance was therefore excluded from the data analyses. After excluding non-epistemic forms, the overall distribution of epistemic modal verbs (together

with their normalised frequencies of per 10,000 tokens) in each of the three sub-corpora was explored in the quantitative analysis.

4. Results and Discussion

4.1. Overall frequency of epistemic modal verbs in the three types of articles

Table 2 gives the overall distribution of epistemic modal verbs (together with their normalised frequencies of per 10,000 tokens) in the abstract sections of the three types of articles in the Humanities & Social Sciences discipline of the CJA (2014). Figure 1 shows the graphical representation of this normalised distribution.

Table 2. Overall distribution of epistemic modal verbs in the Abstract sections of three types of articles

Item	Research Articles	Theoretical Articles	Review Articles
could	5.16	8.43	3.56
may	9.82	17.57	12.04
might	1.84	6.32	3.83
must	0.98	0.70	3.56
should	3.44	11.24	6.57
will	2.58	14.76	8.48
would	2.46	4.92	3.01
couldn't	0.37	0.00	0.00
wouldn't	0.00	0.00	0.00
shouldn't	0.12	1.41	0.00

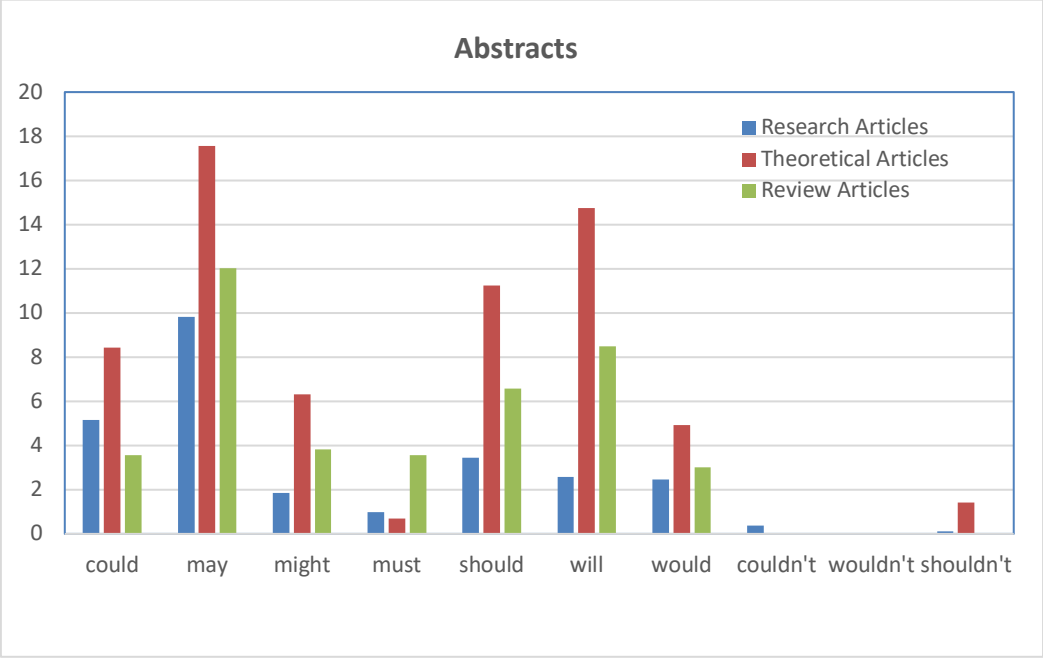

Figure 1. Epistemic modal verbs in the Abstract section of the three types of articles (per 10,000 tokens)

As can be seen from both Table 2 and Figure 1, *may* is the most commonly used epistemic modal verb in the abstract sections of each of the three article types. *Could, may, might, should* and *will* are more frequently used in the abstract sections of theoretical articles. The negative forms *couldn't, wouldn't, shouldn't* are least frequently used in their epistemic sense in each of the three article types.

Figure 2 below shows the graphical representation of the overall distribution of epistemic modal verbs in the Abstract section of Research Articles (per 10,000 tokens).

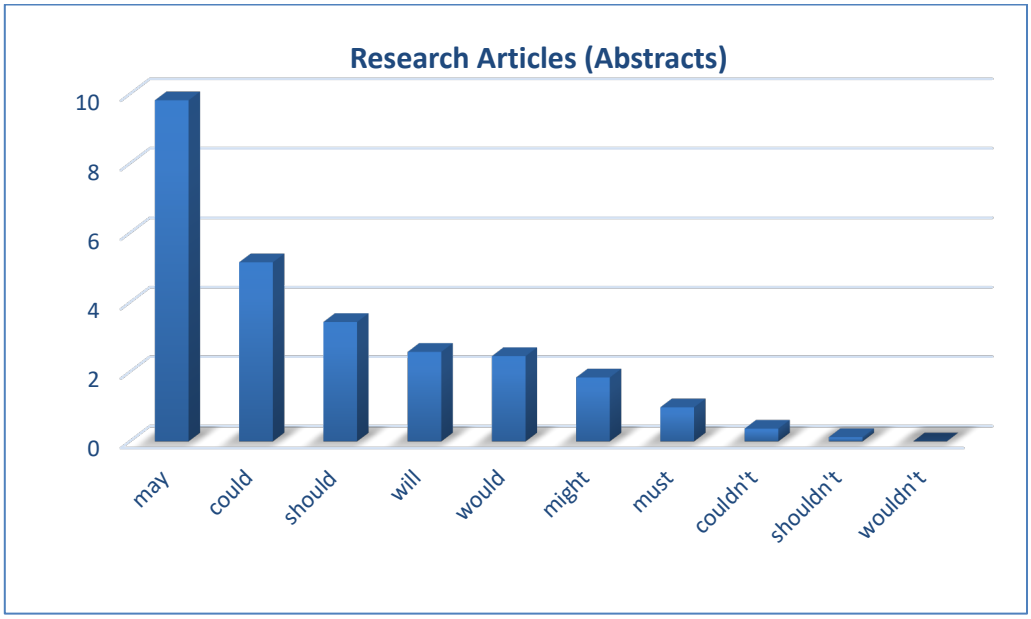

Figure 2. Overall distribution of epistemic modal verbs in the Abstract section of Research Articles (per 10,000 tokens)

As can be seen from Figure 2, the most frequently used three epistemic modal verbs in the abstract section of research articles are *may, could* and *should,* respectively. *Couldn't, shouldn't* and *wouldn't* are the least frequently used three epistemic modal verbs.

Figure 3 below shows the graphical representation of the overall distribution of epistemic modal verbs in the Abstract section of Theoretical Articles (per 10,000 tokens).

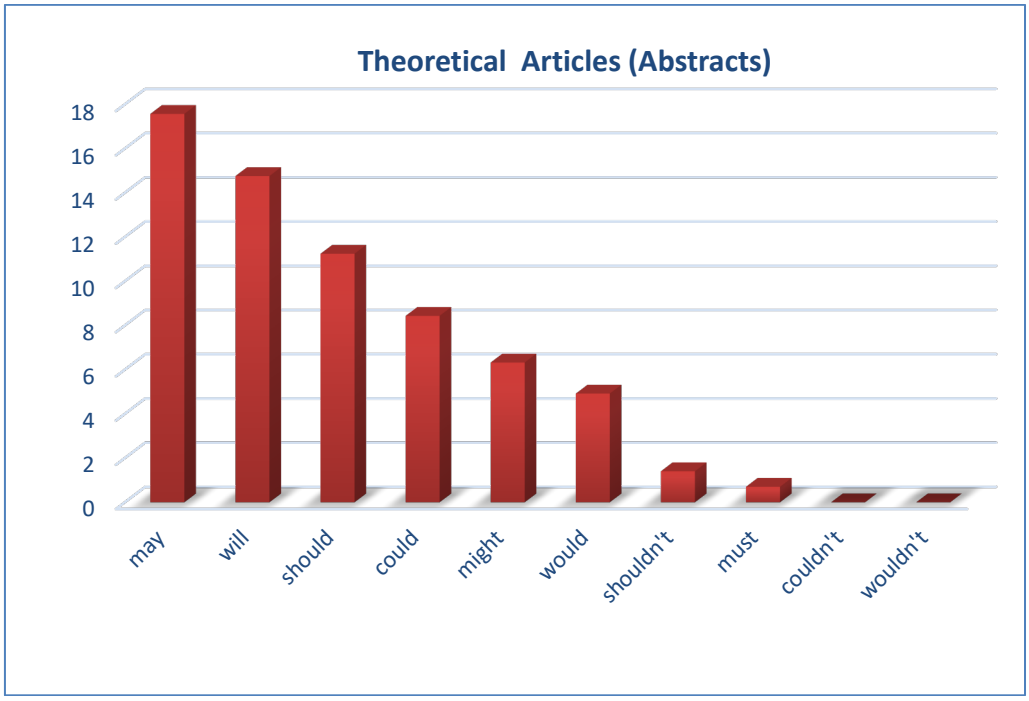

Figure 3. Overall distribution of epistemic modal verbs in the Abstract section of Theoretical Articles (per 10,000 tokens)

It can be seen from Figure 3 that the most frequently used three epistemic modal verbs in the abstract section of theoretical articles are *may, will* and *should,* respectively. *Must, couldn't* and *wouldn't* are the least frequently used three epistemic modal verbs.

Figure 4 below shows the graphical representation of the overall distribution of epistemic modal verbs in the Abstract section of Review Articles (per 10,000 tokens).

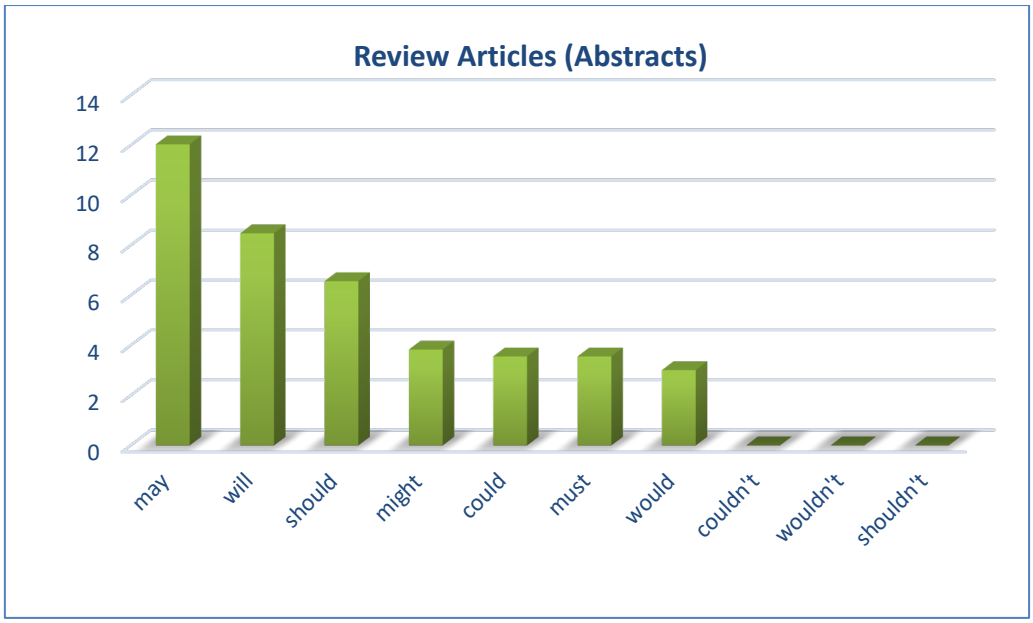

Figure 4. Overall distribution of epistemic modal verbs in the Abstract section of Review Articles (per 10,000 tokens)

It can be seen from Figure 4 that the most frequently used three epistemic modal verbs in the abstract section of review articles are *may, will* and *should,* respectively. *Couldn't, wouldn't* and *shouldn't* are the least frequently used three epistemic modal verbs.

Table 3 gives the overall distribution of epistemic modal verbs (together with their normalised frequencies of per 10,000 tokens) in the introduction sections of the three types of articles in the Humanities & Social Sciences discipline of the CJA (2014). Figure 5 shows the graphical representation of this normalised distribution.

Table 3. Overall distribution of epistemic modal verbs in the Introduction sections of three types of articles

Item	Research Articles	Theoretical Articles	Review Articles
could	4.90	10.01	8.68
may	14.97	13.28	9.79
might	4.95	6.16	3.34
must	2.79	5.10	6.23
should	6.49	7.41	10.02
will	10.19	13.47	8.90
would	5.69	17.80	8.68
couldn't	0.11	1.15	0.22
wouldn't	0.28	1.64	0.45
shouldn't	0.23	1.25	0.00

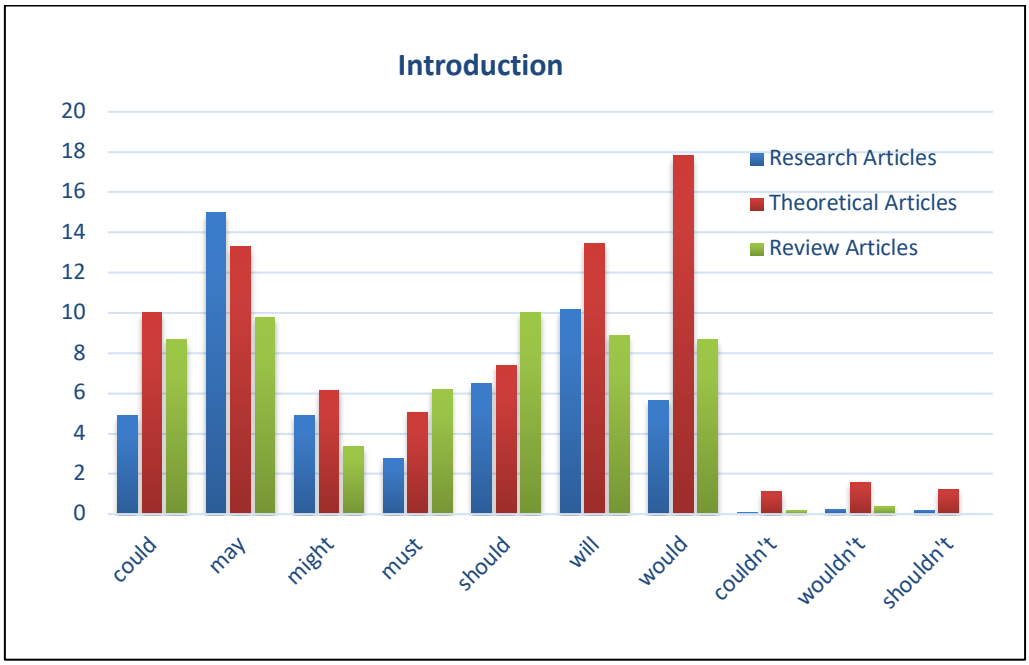

Figure 5. Epistemic modal verbs in the Introduction section of the three types of articles (per 10,000 tokens)

As can be seen from both Table 3 and Figure 5, *could, may, might, will* and *would* are the most commonly used epistemic modal verbs in the introduction section of Theoretical Articles; while *may* is more frequently used in the introduction section of research articles. The negative forms *couldn't, wouldn't, shouldn't* are least frequently used in their epistemic sense in each of the three article types.

Figure 6 below demonstrates the graphical representation of the overall distribution of epistemic modal verbs in the Introduction section of Research Articles (per 10,000 tokens).

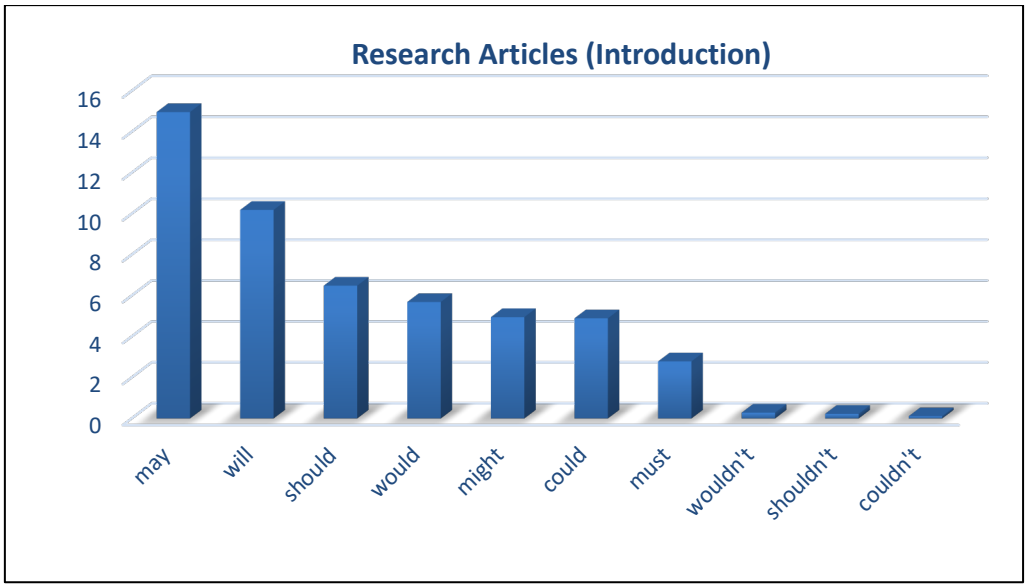

Figure 6. Overall distribution of epistemic modal verbs in the Introduction section of Research Articles (per 10,000 tokens)

It can be seen from Figure 6 that the most frequently used three epistemic modal verbs in the introduction section of research articles are *may, will* and *should,* respectively. *Wouldn't, shouldn't* and *couldn't* are the least frequently used three epistemic modal verbs.

Figure 7 below demonstrates the graphical representation of the overall distribution of epistemic modal verbs in the Introduction section of Theoretical Articles (per 10,000 tokens).

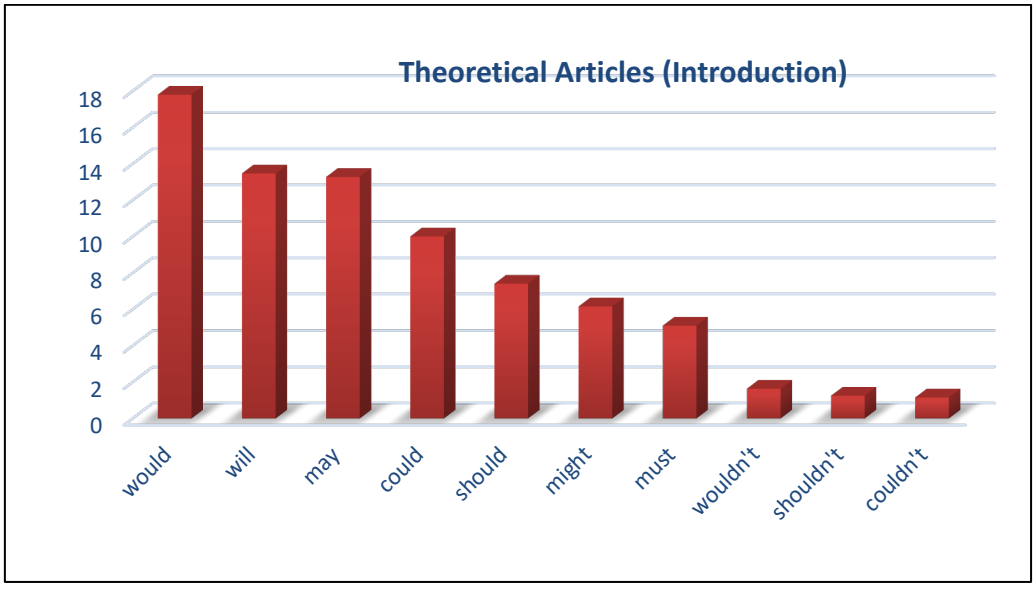

Figure 7. Overall distribution of epistemic modal verbs in the Introduction section of Theoretical Articles (per 10,000 tokens)

As can be seen from Figure 7, the most frequently used three epistemic modal verbs in the introduction section of theoretical articles are *would, will* and *may,* respectively. *Wouldn't, shouldn't* and *couldn't* are the least frequently used three epistemic modal verbs.

Figure 8 below demonstrates the graphical representation of the overall distribution of epistemic modal verbs in the Introduction section of Review Articles (per 10,000 tokens).

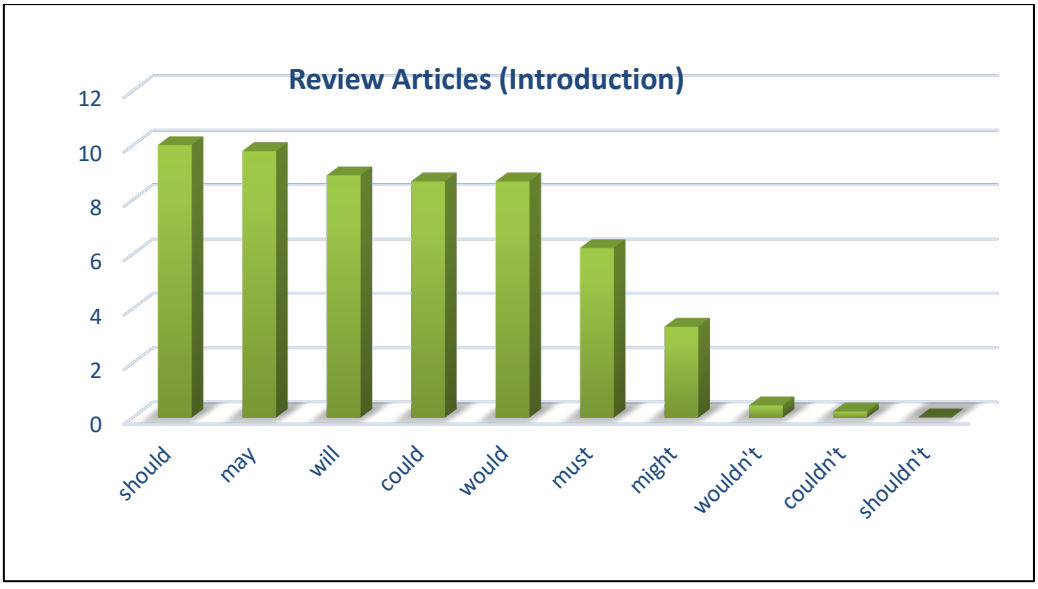

Figure 8. Overall distribution of epistemic modal verbs in the Introduction section of Review Articles (per 10,000 tokens)

Figure 8 above shows that the most frequently used three epistemic modal verbs in the introduction section of review articles are *should, may* and *will* respectively. *Wouldn't, couldn't* and *shouldn't* are the least frequently used three epistemic modal verbs.

4.2. Results of the Log-Likelihood Tests for epistemic modal verbs across the Abstracts section of the three sub-corpora (Research, Theoretical and Review Articles)

In this part, results of the Log-Likelihood Tests for epistemic modal verbs across the abstracts section of the three sub-corpora (Research, Theoretical and Review Articles) are presented in detail.

Table 4 below reveals the Log-Likelihood (LL) values for the epistemic modal verbs between the abstract sections of Research and Theoretical articles.

Table 4. LL values for epistemic modal verbs between the abstract sections of Research and Theoretical articles

Item	Observed frequencies		Expected frequencies		LL	Significance level: p<0.05
	Research	Theoretical	Research	Theoretical		
could	5.16	8.43	6.80	6.80	0.80	
may	9.82	17.57	13.70	13.70	2.22	
might	1.84	6.32	4.08	4.08	2.60	
must	0.98	0.70	0.84	0.84	0.05	
should	3.44	11.24	7.34	7.34	**4.37**	**Sig.**
will	2.58	14.76	8.67	8.67	**9.45**	**Sig.**
would	2.46	4.92	3.69	3.69	0.84	
couldn't	0.37	0.00	0.18	0.18	0.50	
wouldn't	0.00	0.00	0.00	0.00	0.00	
shouldn't	0.12	1.41	0.76	0.76	1.26	

As can be seen from Table 4, the log-likelihood tests carried out to compare epistemic modal verbs between the abstract sections of research and theoretical articles returned significant differences for *should* (LL 4.37) and *will* (LL 9.45) This difference turned out to be statistically significant at the $p<0.05$ level.

Table 5 below reveals the Log-Likelihood (LL) values for the epistemic modal verbs between the abstract sections of Research and Review articles.

Table 5. LL values for epistemic modal verbs between the abstract sections of Research and Review articles

Item	Observed frequencies		Expected frequencies		LL	Significance level: p<0.05
	Research	Review	Research	Review		
could	5.16	3.56	4.36	4.36	0.30	
may	9.82	12.04	10.93	10.93	0.22	
might	1.84	3.83	2.84	2.84	0.71	
must	0.98	3.56	2.27	2.27	1.55	
should	3.44	6.57	5.00	5.00	0.99	
will	2.58	8.48	5.53	5.53	**3.88**	**Sig.**
would	2.46	3.01	2.73	2.73	0.06	
couldn't	0.37	0.00	0.18	0.18	0.50	
wouldn't	0.00	0.00	0.00	0.00	0.00	
shouldn't	0.12	0.00	0.06	0.06	0.16	

As can be seen from Table 5, the log-likelihood tests carried out to compare epistemic modal verbs between the abstract sections of research and review articles returned significant differences for *will* only (LL 3.88). This difference turned out to be statistically significant at the p<0.05 level.

Table 6 below reveals the Log-Likelihood (LL) values for the epistemic modal verbs between the abstract sections of Theoretical and Review articles.

Table 6. LL values for epistemic modal verbs between the abstract sections of Theoretical and Review articles

Item	Observed frequencies		Expected frequencies		LL	Significance level: p<0.05
	Theoretical	Review	Theoretical	Review		
could	8.43	3.56	5.99	5.99	2.04	
may	17.57	12.04	14.80	14.80	1.04	
might	6.32	3.83	5.08	5.08	0.62	
must	0.70	3.56	2.13	2.13	2.09	
should	11.24	6.57	8.90	8.90	1.24	
will	14.76	8.48	11.62	11.62	1.72	
would	4.92	3.01	3.96	3.96	0.46	
couldn't	0.00	0.00	0.00	0.00	0.00	
wouldn't	0.00	0.00	0.00	0.00	0.00	
shouldn't	1.41	0.00	0.70	0.70	1.93	

As Table 6 demonstrates above, the log-likelihood tests carried out to compare epistemic modal verbs between the abstract sections of theoretical and review articles returned statistically no significant differences for any of the epistemic modal verbs at the p<0.05 level.

4.3. Results of the Log-Likelihood Tests for epistemic modal verbs across the Introductions section of the three sub-corpora (Research, Theoretical and Review Articles)

In this part, results of the Log-Likelihood Tests for epistemic modal verbs across the Introductions section of the three sub-corpora (Research, Theoretical and Review Articles) are presented in detail.

Table 7 below reveals the Log-Likelihood (LL) values for the epistemic modal verbs between the Introduction sections of Research and Theoretical articles.

Table 7. LL values for epistemic modal verbs between the Introduction sections of Research and Theoretical articles

Item	Observed frequencies		Expected frequencies		LL	Significance level: p<0.05
	Research	Theoretical	Research	Theoretical		
could	4.90	10.01	7.45	7.45	1.79	
may	14.97	13.28	14.12	14.12	0.10	
might	4.95	6.16	5.56	5.56	0.13	
must	2.79	5.10	3.94	3.94	0.69	
should	6.49	7.41	6.95	6.95	0.06	
will	10.19	13.47	11.83	11.83	0.46	
would	5.69	17.80	11.75	11.75	**6.55**	**Sig.**
couldn't	0.11	1.15	0.63	0.63	0.99	
wouldn't	0.28	1.64	0.96	0.96	1.05	
shouldn't	0.23	1.25	0.74	0.74	0.78	

As can be seen from Table 7, the log-likelihood tests carried out to compare epistemic modal verbs between the introduction sections of research and theoretical articles returned significant differences for *would* (LL 6.55), which is statistically significant at the $p<0.05$ level.

Table 8 below reveals the Log-Likelihood (LL) values for the epistemic modal verbs between the Introduction sections of Research and Review articles.

Table 8. LL values for epistemic modal verbs between the Introduction sections of Research and Review articles

Item	Observed frequencies		Expected frequencies		LL	Significance level: p<0.05
	Research	Review	Research	Review		
could	4.90	8.68	6.79	6.79	1.07	
may	14.97	9.79	12.38	12.38	1.09	
might	4.95	3.34	4.15	4.15	0.32	
must	2.79	6.23	4.51	4.51	1.35	
should	6.49	10.02	8.25	8.25	0.76	
will	10.19	8.90	9.55	9.55	0.09	
would	5.69	8.68	7.19	7.19	0.63	
couldn't	0.11	0.22	0.17	0.17	0.04	
wouldn't	0.28	0.45	0.36	0.36	0.04	
shouldn't	0.23	0.00	0.11	0.11	0.30	

As can be seen from Table 8, the log-likelihood tests carried out to compare epistemic modal verbs between the introduction sections of research and review articles returned statistically no significant differences for any of the epistemic modal verbs at the p<0.05 level.

Table 9 below reveals the Log-Likelihood (LL) values for the epistemic modal verbs between the Introduction sections of Theoretical and Review articles.

Table 9. LL values for epistemic modal verbs between the Introduction sections of Theoretical and Review articles

Item	Observed frequencies		Expected frequencies		LL	Significance level: p<0.05
	Theoretical	Review	Theoretical	Review		
could	10.01	8.68	9.34	9.34	0.09	
may	13.28	9.79	11.54	11.54	0.53	
might	6.16	3.34	4.75	4.75	0.85	
must	5.10	6.23	5.67	5.67	0.11	
should	7.41	10.02	8.71	8.71	0.39	
will	13.47	8.90	11.19	11.19	0.94	
would	17.80	8.68	13.24	13.24	**3.86**	**Sig.**
couldn't	1.15	0.22	0.69	0.69	0.69	
wouldn't	1.64	0.45	1.04	1.04	0.72	
shouldn't	1.25	0.00	0.63	0.63	1.72	

As Table 9 shows, the log-likelihood tests carried out to compare epistemic modal verbs between the introduction sections of theoretical and review articles returned significant differences for *would* (LL 3.86), which is statistically significant at the p<0.05 level.

4.4. Epistemic meanings of the most commonly used epistemic modal verbs across the sub-corpora: “may, will, would”

The modal verb *may* was found to be most commonly used across the sub-corpora for expressing epistemi possibility, weakened prediction sense, speculation on a cause,

interpretation of a result. As for *would* and *will,* writers were found to use *would* in its epistemic sense when they wanted to be more tactful and polite towards their claims, since the epistemic meaning of would, compared to will, "is less assured and forthright" and "is often used to reduce the [writer's] level of confidence in the truth of the proposition" (Collins 2009: 142).

However, epistemic *will* was found to express a prediction that is strong and more direct, and it was used where writers had enormous confidence in the evidence and knowledge that warranted their claims.

4.4.1. Examples of commonly used epistemic modal verbs in research articles sub-corpus: "may, would, will"

- Education-as-product was fairly stable in its ubiquity across our period, but it *may* actually have seen a decline in legitimacy over time. (RA, 6012816)
- Many regions have seen outward expansion during the last several decades, and whether or not this independently influences mode choice, impacts on population density *would* affect potential transit efficiency. (RA, 8858331)
- Furthermore, music therapists *will* create modifications of the systematic review process that are specific and significant to music therapy, such as adapting the research question structure to include… (RA, 10071381)

4.4.2. Examples of commonly used epistemic modal verbs in theoretical articles sub-corpus: "would, may, will"

- Leaving the cafeteria *would* be a successful short-term strategy and *would* be negatively reinforced by the likelihood that… (TA, 3528712)
- Higher asset prices are one channel through which Abenomics *may* help the Japanese economy. (TA, 938014)
- The "public" landscape *will* be the culturally-fixed, shared characteristics of a (local) aggregation of individuals that functions as a filter of information. (TA, 2923215)

4.4.3. Examples of commonly used epistemic modal verbs in review articles sub-corpus: "may, would, will"

- These processes *may* give rise to small scale, typically incremental, physical changes in the public realm: new street furniture, signage, repairs, planting, etc. (RVA, 2154468)
- Thus, we *would* expect revolving-fund agencies to do better than their counterparts at collecting the money they win through enforcement. (RVA, 5594141)
- Different techniques *will* only determine the same shape if they operate at the same time scale. (RV, 4313170)

5. Conclusion and Implications

In this paper, I have comparatively examined the use of epistemic modality in the category of modal verbs in the abstract and introduction sections of journal articles written in the discipline of Humanities & Social Sciences. The articles written in the discipline of Humanities & Social Sciences have further been divided into three sub-corpora for detailed analysis and also to find out differences among the three types of articles in terms of epistemic modal verb use: Research articles (RA), Review articles (RVA) and Theoretical articles (TA).

The findings in this study have revealed several important implications relating to theory and practice. However, the differences of epistemic modal verb use among the different types of articles should be further investigated in different disciplines and corpora in future studies. It has been shown throughout this paper that writers express epistemic modality by using a variety of modal verbs. In this way, they interact with their potential readers by weakening their claims or by making strong assertions towards their propositions. This knowledge may be crucial for especially non-native and novice writers mastering in specific academic disciplines so that they can produce conventionally well-developed academic texts (Doğan & Akbaş, 2021; Akbaş & Hardman, 2018). If they reflect their propositions as safe and convincing as possible, then their potential readers will most likely to be able to make logical inferences based on their claims. It is therefore important that academic writing classes should be re-planned taking into account the epistemic modality usage in different types of articles in different academic fields. For instance, certain writing activities related to epistemic usage of target particular markers can be planned. Teachers can also provide their learners with the basics of epistemic usage by showing them the importance of it through different kinds of texts. Learners can also be made aware of the different functions of modal verbs with the help of these activities.

Doğan & Akbaş (2021) recommend several different activities to enable learners to understand the importance of linguistic and semantic devices to express epistemic modality. Their recommendation of activities include putting given sentences in order to form a paragraph, rewriting sentences and paragraph writing (Doğan & Akbaş, 2021, p.1146). They suggest that these kinds of activities can help learners to better grasp the concept of epistemic modality. Throughout these activities, teachers' role should be to guide their learners and give them critical feedback and they should also emphasize how these linguistic and semantic devices can change the intended meaning of propositions (Doğan & Akbaş, 2021).

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