MINISTERUL EDUCAȚIEI
ROMÂNIA
UNIVERSITATEA DE MEDICINĂ, FARMACIE, ȘTIINȚE ȘI TEHNOLOGIE „GEORGE EMIL PALADE" DIN TÂRGU MUREȘ

FACULTATEA DE ȘTIINȚE ȘI LITERE „PETRU MAIOR"

Acta Marisiensis. Philologia
Volume 5, Issue 1/ September 2023
p-ISSN: 2668-9537, e-ISSN: 2668-9596

sciendo

10.2478/amph-2023-0084

MODAL VERBS IN ENGLISH-MEDIUM RESEARCH ARTICLES ON THE ISSUE OF CLIMATE CHANGE AND HEALTH

***Oleksandr Kapranov*[1]**

[1]*Assoc. Prof., PhD, NLA University College, Oslo, Norway*

Abstract: *The article introduces a quantitative study that examines how modality, which is associated with modal verbs (e.g., must, would, etc.), is represented in English-medium research articles (henceforth – RAs) that are published in specialised scientific journals that focus on the intersection of climate change-related research and health. The aim of the study was to collect a corpus of RAs published in the international peer-reviewed journals Eco-Environment and Health and The Journal of Climate Change and Health and examine the frequency of the occurrence of modal verbs in order to determine the most frequent modals in the corpus. To that end, the corpus was analysed in the software program AntConc (Antony, 2022) in order to establish the frequency of the central modal verbs in English, such as can, could, may, might, must, shall, should, will and would. The results of the quantitative investigation revealed that can and may were the most frequent modal verbs in the corpus. The findings were discussed through the lens of the discourse on climate change and health.*

Keywords: *climate change and health, English-medium research articles, modal verbs, scientific discourse*

1. Introduction

The issue of climate change continues to represent an ongoing challenge (Kapranov, 2022a, 2023a; Lofthouse & Herzberg, 2023), which is characterised by a wide range of profound repercussions that involve corporate, societal, and health-related aspects (Agache et al., 2022; Kapranov, 2015; Paz et al., 2016). In terms of the intersection between the issue of climate change and health, the literature points out to "the varied and substantial effects of climate change on human health and wellbeing" (Kotcher et al., 2021, p. 316). In particular, one of the health-related facets of climate change is associated with the rise in extreme temperature that causes higher levels of human mortality (Astone & Vaalavuo, 2023; Patz & Olson, 2006). Furthermore, climate change is reported to i) contribute to an increase in health-related problems in population with allergies (Luschkova, Traidl-Hoffmann, & Ludwig, 2022), ii) lead to spikes in cardiovascular diseases (Khraishah et al., 2022), and iii) affect negatively people's mental health (Charlson et al., 2022). Given the magnitude and importance of the aforementioned circumstances, there has been an upsurge in the number of research articles

(further – RAs) that address the intersection between the issue of climate change and public health (Agache et al., 2022). In this regard, it is critical to examine how climate change and its impact on health-related issues are communicated to the public at large, as well as to the scientific community (Fløttum, 2010; Kapranov, 2018a; 2018b). Arguably, a linguistic analysis of RAs on climate change and health could provide a deeper understanding of this type of science discourse, which, in turn, could stipulate both public and academic awareness of the climate change-related health matters.

Whilst there is a growing body of RAs on the discourse on climate change and health (Awuor, Meldrum, & Liberda, 2020), currently there seems to be no published research that investigates such discursive means as modal verbs (Huschová, 2015) in the discourse on climate change and health. It should be observed that modality that is typically represented by modal verbs as one of the discursive means (Kapranov, 2016) is associated with a topical "area of linguistic inquiry that seems to enjoy a continuous interest of scholars throughout the years" (Šinkūniene, 2016, p. 206). However, there are no publications that examine how modal verbs are used in RAs that focus on the intersection between climate change and health. Given that there is a clear gap in the contemporaneous scholarship, the present article inaugurates a quantitative study that aims to explore how modal verbs (for instance, *must*, *should*, etc.) are used in RAs that are published in the international peer-reviewed journals *Eco-Environment and Health* and *The Journal of Climate Change and Health* whose aims and scope involve the impact of climate change on health-related matters. Guided by these considerations, the study attempts to answer the following research question:

> **RQ**: What are the most frequent modal verbs in RAs on the issue of climate change and health that are published in the journals *Eco-Environment and Health* and *The Journal of Climate Change and Health*?

Directed by the RQ, the article proceeds as follows. First, an overview of literature on modal verbs in English-medium RAs will be provided in section 2. Thereafter, in section 3, the present study will be introduced and discussed. Finally, the article concludes with the summary of the major findings and their implication to academic discourse on the issue of climate change and health.

2. Modal Verbs in English-Medium Research Articles: Literature Review

As previously mentioned in the introduction, modal verbs as a discursive means in academic discourse attract a considerable amount of scholarly attention (Fløttum, 2010; Huschová, 2015; Kapranov, 2022b). There seems to be a growing body of studies that are dedicated to investigating the role of modal verbs in RAs (Carrió Pastor, 2012; Gabrielatos & McEnery, 2005; Huschová, 2015; Kapranov, 2023b; Millán, 2008; Özcelik, 2023; Piqué, Posteguillo, & Andreu-Besó, 2001; Yagız & Demir, 2014). In this regard, it appears sensible to note that RAs are defined as scientific texts that are characterised by a pragma-communicative purpose and conventionalised features, which involve genre-appropriate forms and presentational functions (Thomas & Hawes, 1994).

The literature indicates that modal verbs are employed in RAs in order to perform a range of pragmatic functions, such as hedging (Huschová, 2015; Kapranov, 2023b; Özcelik, 2023; Yagız & Demir, 2014). In academic writing, hedges are regarded as grammatical devices, which are used by academic writers to convey tentativeness, uncertainty, and caution (Hyland, 1998). In other words, hedges modify the academic writers' "commitment to the truth-value of a proposition, qualifying utterances to mitigate their strength" (Huschová, 2015, p. 44) and allow them to guide the narrative in an RA (Vázquez & Giner, 2008, p. 177). As far as the use of modal verbs as hedges is concerned, the prior studies indicate that whilst academic writers typically resort to the modal verbs *could* and *might* as hedges, they are unlikely to utilise the

modals *can* and *may* as hedging devices (Huschová, 2015). The aforementioned findings, however, seem to be in contrast to the study conducted by Yagız and Demir (2014, p. 267), who have discovered that *may* is one of the most frequent forms of hedging in RAs written by the non-native speakers of English.

In terms of the frequently occurring modals in scientific writing, it is posited in the literature (Piqué, Posteguillo, & Andreu-Besó, 2001, p. 216) that *can* as well as *may* are the most frequent modal verbs that are employed in RAs written by Anglophone academic writers who are native speakers of English. In contrast, however, the modal verb *can* is preferred by the non-native English (NNE) academic writers whose first language (L1) is Spanish (Carrió Pastor, 2012). In particular, it is noted that

> While native English writers seem to deploy may more often than Spanish writers, the latter tends to use must and can more frequently, even when can can be safely replaced by may. (Carrió Pastor, 2012, p. 128)

This finding is reflective of the argument that the use of modal verbs in RAs differs between the cohorts of NNE academic writers and their English L1 counterparts (Yagız & Demir, 2014). At the same time, the prior studies (Gabrielatos & McEnery, 2005; Kapranov, 2022b) indicate that the differences between the cohorts of NNS and English L1 academic writers are not that substantial, at least, as far as the frequency of the occurrence of *could*, *might*, and *would* is concerned. In particular, the literature reports that

> there are no statistically significant differences associated with the frequencies of the central modal verbs in the RA abstracts in applied linguistics that are published in scientific peer-reviewed journals in the Outer and Inner Circles of English (Kapranov, 2022b, p. 26)

As far as the frequency and distribution of the modal verb *would* is concerned, there are seem to be cross-disciplinary similarities that are not dependent on whether or not an academic writer is an English L1 speaker. In this regard, Kapranov (2023b, p. 30) has found that *would* appears to be similarly distributed in RAs in applied linguistics, psycholinguistics, and English literature irrespective of the academic writer's L1 background. Moreover, regardless of the scientific field, *would* has been found to act as a hedge in RAs that encompass multiple domains of science (Hyland, 1998; Kapranov, 2023b). Unlike *would*, however, the modal verb *will* functions as a booster in the discursive space of RAs, where it is reported to be a rather frequently used modal (Millán, 2008). It should be noted that boosters are defined as linguistic devices, which facilitate the academic writer's conviction and certainty as far their scientific claims are concerned (Hyland, 1998). Typically, *will* as a booster is utilised in RAs in order to express strong predictions (Mifdal & Lewis, 2023).

Having outlined the literature on modal verbs in English-medium RAs, it should be reiterated that there are no current studies on the frequency and use of modals in RAs that focus on the intersection between climate change and health. Further in the article, a quantitative computer-assisted study is presented that examines the frequency of the occurrence of the central modals in English in RAs in the journals *Eco-Environment and Health* and *The Journal of Climate Change and Health.*

3. The Present Study

The present study sets out to identify and quantify the occurrence of the central modal verbs in English, namely, *can*, *could*, *may*, *might*, *must*, *shall*, *should*, *will* and *would* in the corpus of RAs that are published in *Eco-Environment*

(https://www.sciencedirect.com/journal/eco-environment-and-health/issues) and *Health* and *The Journal of Climate Change and Health* (https://www.sciencedirect.com/journal/the-journal-of-climate-change-and-health). The choice of these journals is explained by the following considerations. First, both *Eco-Environment and Health* and *The Journal of Climate Change and Health* focus on publishing research that investigates the intersection between climate change and health. Second, the journals are published by Elsevier, a reputable international publisher. Third, the journals are fairly new, first published in 2021 (*The Journal of Climate Chane and Health*) and 2022 (*Eco-Environment and Health*), respectively.

The corpus of the study involves RAs that are available on the journals' websites. It should be specified that the corpus is comprised of RAs and review articles that involve systematic review analyses. Editorials, short communication, errata, comment articles are excluded from the corpus. Importantly, all the RAs and review articles in the corpus are open access items published in the period of time from January 2022 to June 2023. The total number (N) of articles in the corpus is 123 and the total number of words equals 933 069 inclusive of references and appendixes. The descriptive statistics of the corpus per journal inclusive of the mean words and standard deviations (SD) are given in Table 1 below.

Table 1. The Descriptive Statistics of the Corpus

#	**Descriptive Statistics**	***Eco-Environment and Health***	***The Journal of Climate Change and Health***
1	N of articles	41	82
2	N words	410 251	522 818
3	Mean words	10 006.1	6375.8
4	SD words	6505.6	3067.7

As far as the corpus analysis in the study is concerned, the following should be explained in detail. Since the present study did not aim at juxtaposing potential differences and/or similarities between the subcorpus comprised of the RAs and review articles published in *The Journal of Climate Chane and Health* and that of *Eco-Environment and Health*, the two subcorpora outlined in Table 1 were merged in one corpus and analysed as such. The decision to analyse the subcorpora as a single corpus was substantiated by the contention that the journals' aims and scope were fairy similar and comparable. Hence, the RAs and review articles in the corpus were merged into a Word file excluding references and appendices. The file was processed in the computer software programme AntConc version 4.0.11 (Antony, 2022) in order to compute the frequency of the central modal verbs in English (to reiterate, *can*, *could*, *may*, *might*, *must*, *shall*, *should*, *will* and *would*). The application of AntConc (Antony, 2022) yielded the raw, i.e. non-normalised, frequencies of the central modals in the corpus. Additionally, the application of AntConc provided the following statistics – i) the most frequent clusters of the modal verbs in the corpus and ii) modals as the key words in context (KWIC). Thereafter, the raw frequencies of the occurrence of the modal verbs were normalised per 10 000 words in the Statistical Package for Social Sciences or SPSS (IBM, 2012). The results of the quantitative analysis are presented in the subsequent section of the article.

3.1. Results and Discussion

The quantitative analysis has yielded the frequency of the occurrence of the central modals in the corpus normalised per 10 000 words. These statistics are summarised in Table 2 below.

Table 2. The Frequency of the Occurrence of Modal Verbs in the Corpus per 10 000 Words

#	Modal Verbs	The Frequency of the Occurrence per 10 000 Words
1	*Can*	20.5
2	*Could*	11.3
3	*May*	13.1
4	*Might*	2.6
5	*Must*	2.2
6	*Shall*	0.1
7	*Should*	6.9
8	*Will*	7.1
9	*Would*	5.6

It follows from Table 2 that *can* and *may* are the most frequent modal verbs in the corpus. Let us dwell upon this finding in more detail and focus our discussion on the modal verb *can*, which has been established to be the most frequent one in the corpus. First of all, it should be mentioned that the presence of the most frequent modal verbs *can* and *may* supports the prior literature (Carrió Pastor, 2012; Huschová, 2015; Piqué, Posteguillo, & Andreu-Besó, 2001, p. 216), which posits that these modals are considered to be among the most frequent modal verbs in RAs in a range of academic disciplines. For instance, both *can* and *may* have been found among the most frequent modal verbs in RAs in linguistics and discourse studies (Kapranov, 2022b). In addition, it should be observed that the modal verb *can* is deemed to be a rather frequent modal verb in other types of discourses in the English language (Quirk, Svartvik, & Leech, 1985). In line with the literature, it could be argued that the most frequent modal *can* is reflective of the general tendency of scientific discourse to employ it amply. Conceivably, the frequent occurrence of *can* may be regarded as one of the typical characteristics of the style of academic writing in English (Carrió Pastor, 2014). Paraphrasing Thomas and Hawes (1994), we may posit that the frequent occurrence of *can* in the corpus represents a conventionalised genre-appropriate feature of an English-mediated RA on the intersection of climate change and health. Consequently, we may argue that *can* as the most frequent modal verb in the corpus is indicative of the affinity of the discourse on climate change and health with other types of English-medium scientific discourses (Carrió Pastor, 2014; Huschová, 2015). Obviously, this contention should not be generalised given that that the corpus of the present study is limited to the RAs and review articles that are published in two scientific outlets only.

Another explanation of *can* as the most frequent modal verb in the corpus is accounted by its function as a carrier of epistemic modality (Gabrielatos & McEnery, 2005). In this regard, it should be specified that epistemic modality reflects the academic writer's assessment of truthfulness of the proposition in terms of certainty, probability or possibility (Downing & Locke, 1992, p. 382). This contention seems to be supported by the analysis of the most frequent clusters of *can*, as well as other modals, in the corpus. The cluster analysis, which was yielded by AntConc (Antony, 2022) is summarised in Table 3 below.

Table 3. The Most Frequent Clusters of Modal Verbs in the Corpus

#	Modal Verbs	The Most Frequent Clusters in the Corpus

1	*Can*	Can be, can also, can provide, can cause, can help, can lead, can reduce, can result, can serve, can not
2	*Could*	Could be, could have, could also, could not, could lead, could provide, could help, could induce, could affect, could enter
3	*May*	May be, may have, may also, may not, may help, may lead, may cause, may include, may affect, may increase
4	*Might*	Might be, might have, might not, might result, might cause, might also, might help, might contribute, might explain, might lead
5	*Must*	Must be, must also, must recognize, must go, must therefore, must work, must address, must advocate, must combine, must engage
6	*Shall*	Shall bear, shall be
7	*Should*	Should be, should also, should not, should focus, should include, should take, should consider, should have, should work, should examine
8	*Will*	Will be, will continue, will also, will have, will increase, will require, will help, will not, will lead, will likely
9	*Would*	Would be, would like, would have, would not, would help, would also, would result, would lead, would increase, would need

It follows from Table 3 that *can* is involved in the frequently used clusters "can + verb" that denote either the academic writers' conviction as exemplified by excerpt (1) or possibility as illustrated by excerpt (2), as well as the writers' reference to ability, which is considered one of the root meanings of *can* as seen in excerpt (3):

> (1) In addition to drought, high temperature and low precipitation can increase the risk of wildfire, extending fire season and burning time in some areas. Other climatic conditions, such as El Niño-Southern Oscillation (ENSO) are also associated with frequent droughts and wildfires in some coastal regions […]. Direct health impacts of wildfire events include burns, injuries, mental health effects, and premature deaths. (Zhao et al., 2022, p. 55)

> (2) Importantly, concepts can be used to expand resident understanding of and competencies on environmental justice and racial health inequities across geographically diverse practice settings. It is also a chance to frame climate change or other subjects primarily as public health issues and opportunities with many solutions available. (Moretti et al., 2023, p. 6)

> (3) Societal actions in the next decade will determine the extent to which we can limit temperature rises and their resultant health impacts. Progress has been made, but not to the scale nor speed required. (Cooke et al., 2022, p.1)

It should be remarked that whilst (1) and (2) pertain to the epistemic uses of *can*, (3) represents its root meaning. In addition to the frequent clusters of "can + verb" in the corpus (see Table 3 and excerpts (1) – (3)), the epistemic use of the most frequent modal verb *can* in the corpus seems to be associated, predominantly, with possibility and ability. This finding is supported by the results of the AntConc (Antony, 2022) function "key words in context" (KWIC) that are further outlined in Table 4.

Table 4. *Can* as a Key Word in Context (KWIC)

#	**KWIC Examples**
1	Can be used to prevent the crisis
2	Can be used to overcome the challenges
3	Can be used to predict the removal efficiency
4	Can be used to rank chemicals according to their effect
5	Can be used to test the health effects
6	Can be used to vacuum settled dust from floors
7	Can be used to distinguish natural and engineered metal oxide
8	Can be used to calculate the exposure
9	Can be used to recognize the occurrence
10	Can be used to distinguish the relative importance

It is evident from Table 4 that *can* is contextualised in the corpus as a verb phrase "can be used + verb" that is related to expressing possibility and, concurrently, possibility and ability. In contrast to the aforementioned use of *can*, however, *may*, which is the second frequent modal verb in the corpus, seems to denote possibility as a hedging device. This observation is evident from Table 5 below that shows the modal verb *may* as a KWIC.

Table 5. May as a Key Word in Context (KWIC)

#	**KWIC Examples**
1	May be an effective way to solve the problem
2	May be a future concern, using a food restriction model
3	May be a major issue for future governance of brownfield
4	May be a major factor driving monthly variation
5	May be an important consideration
6	May be a potential effect modifier
7	May be a causative factor
8	May be a label applied by a clinician, reflecting the
9	May be a response bias
10	May be a viable solution

The findings outlined in Table 5 lend support to the previous studies (Huschová, 2015; Hyland, 1998; Kapranov, 2023b; Özcelik, 2023; Vázquez & Giner, 2008; Yagız & Demir, 2014), which indicate that *may* in routinely used as a hedge in academic writing in English in order to mitigate the strength of the authors' argument, and present the results with tentativeness

and caution. Also, the findings in the present study that concern *may* as the second frequent modal in the corpus validate the study conducted by Yagız and Demir (2014), who demonstrate that *may* is fairly frequently used as a hedge in English-medium RAs.

Concluding the discussion section of the article, it should be borne in mind the discussion is centred on *can* as the most frequent modal verb in the corpus, whilst *may* as the second frequent modal is mentioned briefly in order to highlight its role as the hedge. It is beyond the scope of the present investigation to provide an exhaustive account of the less frequent modals in the corpus, such as, for instance, *shall*, *should*, *will*, etc.

4. Conclusions

The article presented and discussed a novel study that investigates the frequency of the occurrence of central modal verbs in the corpus of RAs on the intersection of climate change and health-related issues. Given that climate change is often problematised in the literature through the lens of adjacent scientific domains (Kapranov, 2022c, 2023c), the article's focus on interdisciplinary discourse on climate change in English-medium RAs published in *Eco-Environment and Health* and *The Journal of Climate Change and Health* can be relevant to linguists and health workers alike.

By means of applying a quantitative methodology, the study has revealed that RAs, which are published in *Eco-Environment and Health* and *The Journal of Climate Change and Health* and written on the intersection of climate change and health-related research, employ *can* as the most frequent modal verb. *Can* has been found to be used in its epistemic and root meanings. The finding is regarded as one of the tokens of conformity of the discourse on climate and health-related issues to the genre-appropriate norms of scientific discourse, which are characterised by an ample use of *can* in RAs in the range of scientific disciplines. Additionally, it has been established that *may* appears to be the second frequent modal verb in the corpus, which is used as a hedging device in order to offset strong claims and express tentativeness.

Conceivably, the present findings contribute to a better understanding of how health and climate change-related discourse is communicated to the scientific community and the public at large by means of employing such discursive means as modal verbs (Kapranov, 2017a; 2017b). It should be concluded that whilst the limited corpus of the study does not provide a solid ground for generalisability of the results, the study's novelty facilitates future research in this area and purports to a deeper understanding of scientific discourse written on the intersection of climate change and health-related research.

BIBLIOGRAPHY

Agache, I., Sampath, V., Aguilera, J., Akdis, C. A., Akdis, M., Barry, M., Bouagnon, A., Chinthrajah, S., Collins, W., Dulitzki, C., Erny, B,. Gomez, J., Goshua, A., Jutel, M., Kizer, K., Kline, O., LaBeaud, D., Pali-Schölli, I., Perrett, K., Peters, R., Plaza, M., Prunicki, M., Sack, T., Salas, R., Sindher, S., Sokolow, S., Thiel, C., Veidis, E., Wray, B., Traidl-Hoffmann, C., Witt, C., & Nadeau, K. (2022). Climate change and global health: a call to more research and more action. *Allergy*, *77*(5), 1389-1407. https://doi.org/10.1111/all.15229

Antony, L. (2022). *AntConc* (Version 4.0.11) [Computer Software]. Tokyo, Japan: Waseda University, available at https://www.laurenceanthony.net/software.

Astone, R., & Vaalavuo, M. (2023). Climate change and health: Consequences of high temperatures among vulnerable groups in Finland. *International Journal of Social Determinants of Health and Health Services*, *53*(1), 94-111. https://doi.org/10.1177/00207314221131208

Awuor, L., Meldrum, R., & Liberda, E. N. (2020). Institutional engagement practices as barriers to public health capacity in climate change policy discourse: lessons from the Canadian Province of Ontario. *International Journal of Environmental Research and Public Health*, *17*(17), 1-39. https://doi.org/10.3390/ijerph17176338

Carrió Pastor, M. (2012). A contrastive analysis of epistemic modality in scientific English. *Revista de Lengua para Fines Específicos*, *18*, 115-132.

Carrió Pastor, M. (2014). Cross-cultural variation in the use of modal verbs in academic English. *SKY Journal of Linguistics*, *27*(1), 153-166.

Charlson, F., Ali, S., Augustinavicius, J., Benmarhnia, T., Birch, S., Clayton, S., Fielding, K., ones L., Juma, D., Snider, L., Ugo, V., Zeitz, L, Jayawardana, D., La Nauze, A., & Massazza, A. (2022). Global priorities for climate change and mental health research. *Environment International*, *158*, 1-9. https://doi.org/10.1016/j.envint.2021.106984.

Cooke, E., Cussans, A., Clack, A., & Cornford, C. (2022). Climate change and health scorecard: What are UK professional and regulatory health organizations doing to tackle the climate and ecological emergency?. *The Journal of Climate Change and Health*, *8*, 100164. https://doi.org/10.1016/j.joclim.2022.100164.

Downing, A. & Locke, P. (1992). *A University Course in English Grammar.* Hemel Hempstead: Phonix ELT.

Fløttum, K. (2010). A linguistic and discursive view on climate change discourse. *ASp. la revue du GERAS*, (58), 19-37.

Gabrielatos, C., & McEnery, T. (2005). Epistemic modality in MA dissertations. In P. Fuentes Olivera (ed.) *Lengua y Sociedad: Investigaciones recientes en lingüística aplicada. Lingüística y Filología no. 61*., (pp. 311-331). Valladolid: Universidad de Valladolid.

Huschová, P. (2015). Exploring modal verbs conveying possibility in academic discourse. *Discourse and Interaction*, *8*(2), 35-47.

Hyland, K. (1998). Boosting, hedging and the negotiation of academic knowledge. *Text & Talk*, *18*(3), 349-382. https://doi.org/10.1515/text.1.1998.18.3.349.

IBM Inc. (2012). *IBM SPSS Statistics*. [Computer Software]. Chicago.

Kapranov, O. (2015). Do international corporations speak in one voice on the issue of global climate change: The case of British Petroleum and The Royal Dutch Shell Group. In C. Can, A. Kilimci, & K. Papaja (eds.) *Social Sciences and Humanities: A Global Perspective*, (pp. 306-322). Ankara: Detay Yayıncılı.

Kapranov, O. (2016). Corpus analysis of discourse markers in corporate reports involving climate change. *EPiC Series in Language and Linguistics*, *1*, 216-227.

Kapranov, O. (2017a). Conceptual metaphors associated with climate change in corporate reports in the fossil fuels market. Two perspectives from the United States and Australia. In K. Fløttum (ed.) *The Role of Language in the Climate Change Debat*e, (pp. 102-122). New York: Routledge. https://doi.org/10.4324/9781315456935.

Kapranov, O. (2017b). The framing of climate-change discourse by Shell and the framing of Shell's climate change-related activities by the Economist and the Financial Times. *Bergen Language and Linguistics Studies*, *7*, 55-69. https://doi.org/10.15845/bells.v7i0.1088.

Kapranov, O. (2018a). The framing of climate change discourse by Statoil. *Topics in Linguistics, 19* (1), 54-68. https://doi.org/10.2478/topling-2018-0004.

Kapranov, O. (2018b). Conceptual metaphors associated with climate change. In R. Augustyn & A. Mierzwińska-Hajnos (eds.) *New Insights into the Language and Cognition Interface*, (pp. 51-66). Newcastle upon Tyne: Cambridge Scholars Publishing.

Kapranov, O. (2022a). The syntax of climate change: Syntactic means in the construction of Greta Thunberg's community identity on Facebook. *Studia UBB Philologia, 67*(4), 15-33. https://doi.org/10.24193/subbphilo.2022.4.01.

Kapranov, O. (2022b). Modal verbs in research article abstracts in applied linguistics: Juxtaposing discursive practices of the Inner and Outer Circles of English. *East-West Cultural Passage*, *22*(2), 6-34. https://doi.org/10.2478/ewcp-2022-0013.

Kapranov, O. (2022c). The discourse of sustainability in English Language Teaching (ELT) at the University of Oxford: Analyzing discursive representations. *Journal of Teacher Education for Sustainability*, *24*(1), 35-48. https://doi.org/10.2478/jtes-2022-0004.

Kapranov, O. (2023a). Throwing soup at Van Gogh: The framing of art in climate change activism by British mass media. *Discourses on Culture*, *19*(1), 175-200. https://doi.org/10.2478/doc-2023-0008.

Kapranov, O. (2023b). "Would" in research article abstracts across three disciplines. In M. Skorasinska (ed.) *Modal Verbs and Modality: From Literary to Non-Literary Texts*, (pp. 29-58). Newcastle upon Tyne: Cambridge Scholars Publishing.

Kapranov, O. (2023c). Modal verbs in sustainability discourse by the University of Cambridge and the University of Oxford: Comparing discursive practices. *Bergen Language and Literature Studies (BELLS), 13*(1), 1-18.

Khraishah, H., Alahmad, B., Ostergard Jr, R. L., AlAshqar, A., Albaghdadi, M., Vellanki, N., Chowdhuri, M., Al-Kindi, S., Zanobetti, A., Gasparrini, A., & Rajagopalan, S. (2022). Climate change and cardiovascular disease: implications for global health. *Nature Reviews Cardiology*, *19*, 798–812. https://doi.org/10.1038/s41569-022-00720-x

Kotcher, J., Maibach, E., Miller, J., Campbell, E., Alqodmani, L., Maiero, M., & Wyns, A. (2021). Views of health professionals on climate change and health: a multinational survey study. *The Lancet Planetary Health*, *5*(5), 316-323. https://doi.org/10.1016/S2542-5196(21)00053-X

Lofthouse, J. K., & Herzberg, R. Q. (2023). The continuing case for a polycentric approach for coping with climate change. *Sustainability*, *15*(4), 1-24. https://doi.org/10.3390/su15043770.

Luschkova, D., Traidl-Hoffmann, C., & Ludwig, A. (2022). Climate change and allergies. *Allergo Journal International*, *31*(4), 114-120. https://doi.org/10.1007/s40629-022-00212-x.

Mifdal, M., & Lewis, M. (2023). Revisiting the use of hedges and boosters in scientific research articles in Morocco: Caution that does not exclude conviction. *Cultures of Science*, *6*(1), 113-130. https://doi.org/10.1177/20966083231159737.

Millán, E. L. (2008). Epistemic and approximative meaning revisited: The use of hedges boosters and approximators when writing research in different disciplines. In S. Burgess, S., P. Martin-Martin (Eds.) *English as an Additional Language in Research Publication and Communication*, (pp. 65-82). Bern: Peter Lang.

Moretti, K., Rublee, C., Robison, L., Aluisio, A., Marin, B. G., McMurry, T., & Sudhir, A. (2023). Attitudes of US emergency medicine program directors towards the integration of climate change and sustainability in emergency medicine residency curricula. *The Journal of Climate Change and Health*, *9*, 100199. https://doi.org/10.1016/j.joclim.2022.100199.

Özcelik, A. E. Hedges and boosters in research article abstracts of Turkish and Chinese scholars. *Journal of Language Education and Research*, *9*(1), 148-160. https://doi.org/10.31464/jlere.1057023.

Quirk, R., J. Svartvik & Leech, G. N. (1985). *A Comprehensive Grammar of the English Language*. London & New York: Longman.

Paz, S., Negev, M., Clermont, A., & Green, M. S. (2016). Health aspects of climate change in cities with Mediterranean climate, and local adaptation plans. *International Journal of Environmental Research and Public Health*, *13*(4), 1-20. https://doi.org/10.3390/ijerph13040438.

Patz, J. A., & Olson, S. H. (2006). Climate change and health: global to local influences on disease risk. *Annals of Tropical Medicine & Parasitology*, *100*(5-6), 535-549. https://doi.org/10.1179/136485906X97426.

Piqué, J., Posteguillo, S., & Andreu-Besó, J. V. (2001). A pragmatic analysis framework for the description of modality usage in academic English contexts. *ELIA, 2, 213-224*.

Šinkūnienė, J. (2016). The modal verb galėti 'can/could/may/might' in academic Lithuanian: distribution, frequency and semantic properties. *Kalbotyra*, (69), 205-222.

Thomas, S., & Hawes, T. P. (1994). Reporting verbs in medical journal articles. *English for specific purposes*, *13*(2), 129-148. https://doi.org/10.1016/0889-4906(94)90012-4.

Vázquez, I., & Giner, D. (2008). Beyond mood and modality: epistemic modality markers as hedges in research articles. A cross-disciplinary study. *Revista Alicantina de Estudios Ingleses, 21*, 171-190.

Yagız, O., & Demir, C. (2014). Hedging strategies in academic discourse: a comparative analysis of Turkish writers and native writers of English. *Procedia-Social and Behavioral Sciences*, *158*, 260-268. https://doi.org/10.1016/j.sbspro.2014.12.085.

Zhao, Q., Yu, P., Mahendran, R., Huang, W., Gao, Y., Yang, Z., Ye, T., Wen, B., Wu, Y., Li, S., & Guo, Y. (2022). Global climate change and human health: Pathways and possible solutions. *Eco-Environment & Health*, 1(2), 53-62. https://doi.org/10.1016/j.eehl.2022.04.004.