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# BETWEEN DETACHMENT AND COMMITMENT: HEDGING AND BOOSTING FROM SCIENTIFIC ARTICLES TO UNIVERSITY PRESS RELEASES

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## **Abstract**

In the press releases (PRs) issued by universities to showcase the research of their affiliated authors, the purpose of knowledge dissemination seems to coexist with that of self-promotion (e.g. Di Ferrante et al., 2021; Petrocelli et al., 2022). This reflects the hybrid nature of corporate PRs (e.g., Jacobs, 1999; Catenaccio, 2008). Considering that academic discourse often enhances reliability through hedging strategies (e.g., Hyland, 1998a), whereas science news tends to emphasise the impact of findings (e.g., Stocking, 1999), this study examines how hedges and boosters of academic discourse manifest in press releases. A mixed-method approach was used to analyse 30 academic articles and their associated press releases. Results highlight the prevalence of boosters in PRs. However, these also contain hedges to convey credibility by acknowledging scientific uncertainties. Further studies with a larger corpus and additional metadiscursive elements are proposed to validate these results.

## **Key words**

*Hedges; boosters; academic discourse; press releases; popularisation of science*

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## **1. Introduction<sup>1</sup>**

English for specific purposes (ESP) and academic purposes (EAP) are characterised by specific discourse types with an underlying stratum of common features and a meaningful degree of variation according to the subject matter to which each relates. Variation is also possible within the same area of technicality, and it grades based on the level of specialised explanation and the different genres used (see Cloître & Shinn 1985; Garzone 2020). At the very end of this vertical continuum of variation stand scientific articles, which, together with scholarly books, retain the utmost levels of specialised and formal discourse.

Some texts directly stem from scholarly papers, like seminars, lectures, and reviews. One that has recently come in use in the academic field is the press release published on university websites, aimed at laypeople and, possibly,

journalists, to report on recently published scholarly papers written by affiliated scholars. Universities have started to borrow this type of text from corporate bodies, which use them for a double purpose: to inform about progress in a company while promoting it. This dual function has defined them as hybrid texts (for example, Jacobs 1999; Bhatia 2004; Catenaccio 2008), and it has been suggested that this hybridity is enhanced in university press releases (Di Ferrante et al. 2021), where the characteristics of the discourse of corporate press releases meet those of scientific discourse in published papers. Nonetheless, if the textuality of corporate press releases has found interest in scholars (Jacobs 1999; Lassen 2006; Bhatia 2004; Catenaccio 2008, among others), that of university press releases has not yet received extensive attention.

The present study analyses part of a larger corpus comprising two matching sub-corpora: one of the scientific articles (SCAR, SCientific ARTicles) and the other one of their correspondent press releases (UNREP, UNiversity REsearch Press releases). The general aim of the whole research is to investigate how some specific features of scientific articles permeate university releases and how the hybridity of press releases as a genre is connoted in this process (see Di Ferrante et al. 2021; Petrocelli et al. 2022). Two factors are connected to the enhanced hybridity of university press releases, which spring from both scientific articles and corporate press releases. The first factor concerns the tenors in the context of communication. As previously stated, the addressees are not primarily scholars but rather laypeople and possibly journalists. Likewise, writers of press releases are not or not only the authors of scholarly articles. The second one resides in the promotional function of corporate press releases, which – as suggested by former research – seems to permeate university press releases as well, given the attempt of entrepreneurial universities to sponsor themselves through the work of their scholars. The relative studies carried out so far evidenced how features of promotion like downplaying/intensifying strategies, the recurrent use of specific n-grams or the crafting of headlines characterise press releases published by universities. The current study aligns with the former analyses and aims to focus on hedging and boosting strategies in academic discourse and the ways and frequency with which these permeate into press releases. The frequency of hedges has been proven to vary significantly across different genres in written texts, and advertising, newspaper news, and academic texts show high numbers of such occurrences (Stubbs 1996). In scientific discourse, hedges have a crucial face-saving function. Lowering the assertive tone of propositions increases the reliability of the study's approach and shows a balanced, unbiased position on claims. As for science news, it has been shown that there is a tendency to minimise or omit scientific uncertainties, oversimplify the context of the research and emphasise the impact of the results, and as such, avoiding stressing the need for confirmatory studies (Stocking 1999; Arora & Arora 2006; Angell & Kassirer 1994).

When it comes to corporate press releases, a face-saving function has generally been present through a disclaimer with explicit acknowledgement of risks and uncertainties on the predictions of the future gains of the company communicated in the press release. McLaren-Hankin (2008) analysed hedging in a British English corporate press release corpus. Borrowing Hyland's (1998a) definition, the author

identified forward-looking statements with both 'accuracy-oriented' hedges, which enhance the reliability of the propositional content and 'writer-oriented' ones, which limit the writer's commitment to avoid legal problems in case the projections communicated are not realised. Unlike the latter, the former is not a significant feature in the corpus the author examined. Liu & Zhang (2021) highlighted how hedges and boosters are one of several metadiscourse patterns used for persuasive attempts with the rhetorical appeal of ethos, pathos, and logos.

As for the few studies focusing on academic PRs, Woloshin and Schwartz (2002) analyse press releases of scholarly articles published in medical journals, and they stress the lack of limitations, arguing the presence of formats prone to exaggerating the role of industry funding. They suggest standardising academic press releases according to the abstract formats used in scholarly papers and including a section with results, limitations, and potential conflicts of interest. Coherently with what Woloshin & Schwartz (2002) argue, Sumner et al. (2016) trace exaggeration (the counterpart of limitation) as a distinctive feature of university press releases. They analysed medical press releases based on research and found that more than a third contained claims and advice that were not present in scholarly articles. So, the accusation of exaggeration was not to be addressed to the news derived from press releases but to the press releases themselves. This is consistent with research highlighting that science news is rarely hedged and addresses studies more certainties than what they actually convey (e.g., Pellechia 1997; Tankard & Ryan 1974; Stocking 1999).

As hedging is argued to be a typical device of academic discourse (see Hyland 1998a, among others), I believe it can work as a valuable lens to investigate the language processes involved in the migration from scholarly papers to university press releases. This will possibly give answers on the approach with which claims are made and negotiated when the context of communication mutates and the informative function of scholarly papers is accompanied by self-promotional attempts, as in the inborn nature of press releases. Answers in that regard will plausibly be backed up by the analysis of boosters, which will be carried out alongside. While hedging weakens claims, boosting strengthens them, enhancing total commitment to the propositions and a bolder stance.

To wrap up, being university PRs a derived text from academic discourse I assume that some typical hedging strategies will osmotically migrate into the textual discourse strategies of PRs. At the same time, boosting academic discourse strategies will also permeate because of the inborn promotional function of PRs, which may lead to a bolder stance to grasp readers' and journalists' interests. Nevertheless, I expect that PRs will be not void of hedging devices, being scientific uncertainty essential for enhancing the credibility of research (Popper 1961) and useful to strengthen arguments at some point (Meyer 1997). Studies like Crismore and Vande Kopple (1997) or Jensen (2008) highlight that scientists are viewed as more trustworthy when research is hedged.

## 2. Hedging, boosting and degrees of commitment in academic discourse

Like spoken ones, written texts also involve tenor interaction, including those for academic purposes. As Hyland (1994) suggests, recalling studies by Widdowson (1984: 220) and Bazerman (1985), the author writes in a way that takes into consideration the expected audience's characteristics in order to anticipate their reactions. Weighing assumptions to argue claims, supporting evidence and drawing conclusions are pivotal elements when relating to research, and the modality in which they are presented impacts the reader's attitude towards the author and content. Likewise, readers try to grasp the author's thoughts and assess the text's utility and interest to them according to this modality. Academic writing achieves rhetorical goals in the interchange between author and reader to the point that even the choice to use the impersonal style to reduce the impact of the writer's involvement serves, in fact, as a marker of their presence and standpoint. This clashes with the idea that academic discourse is merely shaded by objectivity and informativity nuances. Rather, the author's choices and tendencies stand out quite distinctively (Hyland 1994).

Among the rhetorical devices used to establish this author-reader relationship, hedges and boosters address mitigation and enhancement to the proposition of claims. In so doing, they carry what Hyland (1998a) defines as affective meaning, and Biber refers to as interpersonal stance (Biber et al. 1999). They are metadiscursive phenomena compassing lexical, syntactic and pragmatic levels of language. As Crismore and Farnsworth (1990: 119) point out, while discourse has to do with the *overt* presence of writers, who inform about the content of the propositional units, metadiscourse discloses their *non-overt* attempt to conduct the reader in interpreting the text (see also Bondi 2005).

In this attempt, hedging expressions downplay the incisiveness of claims, and in so doing, they manifest an epistemic stance, an attitude to knowledge that paves the way to approximation, alternatives, limitations, and disagreement (Biber et al. 1999: 557). The balanced approach of the writer, as shown by the use of hedges, enhances reliability and opens a higher chance of appreciation in the academic community (e.g., Hyland 1998a). Hedges also signal the author's engagement with previous literature, inviting further exploration and dialogue within the research field. Research suggests that academic writing is shaped by a careful balance of epistemic commitment, with some strategic boosters and a higher degree of hedges overall (Aull 2015; Lancaster 2014, 2016).

There are several taxonomies of hedges; some are based on their function, and others on their morphosyntactic category (e.g., Prince et al. 1982, Salager-Meyer 1994, Clemen 1997, Mauranen 1997). As for those based on functions, Crismore and Farnsworth (1990) include hedges in the interpersonal function of 'validity markers', which are one of the seven categories proposed by Vande Kopple (1985).

Del Olmo (2006) describes hedging as a tridimensional concept, which implies: "a) vagueness and intentional fuzziness, b) author's modesty in terms of own achievements and personal implication and c) impossibility or unwillingness to reach an absolute precision nor quantify all the observed phenomena" (p. 210).

She proposes a taxonomy with a cross-generic point of view that relates hedging linguistic items at the morphological, lexical and syntactical levels to their pragmatic and discursive functions.

Taxonomies focusing on hedges' morphosyntactic categories include items from different word classes. Research has shown that among the most represented categories are modal auxiliary verbs (e.g., *might, could, may*), adjectives, adverbs and nouns of epistemic stance (e.g., *likely, generally, possibility*), lexical verbs with an epistemic value (e.g., *seem, think, believe, suggest, appear*) (see Perkins 1983; Hyland 1998a; Biber et al. 1999; Aull & Lancaster 2014). All these forms imply that the propositions made and the beliefs conveyed are well-weighed and that the author has no intention to influence the reader to value alternative options.

Boosters are another metadiscursive strategy at the offset of hedges. At a functional level, they increase epistemic commitment to express confidence and strengthen claims to convince readers of the validity of research findings. Among the word classes of items covering this function are modal verbs such as *can, must*, and epistemic *will*; adverbs like *certainly, absolutely, obviously, definitely, clearly* and *undoubtedly*; verbs like *demonstrate* (e.g. Aull & Lancaster 2014; Myers 1989; Hyland 1998a, 1998b, 1998c). These items aid writers in enhancing the strength and impact of their claims, the involvement with the topic, and the engagement with readers (Biber et al. 1999; Hyland 2005; Quirk et al. 1985).

Crismore, Markkanen, and Steffensen (1993) used a cline to locate the level of commitment and detachment of propositions. Stubbs (1986) envisaged varying degrees of certainty: from the very moderate propositions of detachment to the very blunt ones of commitment. It is reasonable to argue that hedges and boosters are on opposite sides of that same continuum (Aull & Lancaster 2014; Akbas & Hardman 2018). While hedges legitimise potential disagreement through more indirect statements, boosters leave little room for dialogic space emphasising engagement and the validity of propositions (Hyland 1998a, 2005; Hyland & Tse 2004; Vande Kopple 1985, 2002).

This factor leads to the assumption that the communicative goals of scientific articles and their popularised pieces (PRs) inherently shape their respective authors' approaches in terms of commitment. On the one hand, the informative aim that structures the textuality of scientific articles needs to blend science's caution with researchers' engagement towards their investigation topic. On the other hand, this aim migrates into PRs and coexists with the promotional attempt of the hybrid genre; in so doing, the author's commitment might increase in the pursuit to convince the reader of the validity of the research itself.

### 3. The study

#### 3.1. Aims and research questions

This study attempts to contribute to research on hedges and boosters in academic writing, and it does so by comparing two very specific genres: scientific articles and university press releases.

As mentioned above, this research is based on the assumption that the mainly informative nature of scientific texts and the informative-promotional nature of university press releases manifest different levels of engagement towards the claims made. Moreover, since PRs spring from the scholarly pieces they report about, I assume that the textuality of the latter does migrate at some level into the popularised pieces. It would be thus interesting to see how the specific aim of university press releases relates to the textuality of the source text.

These premises pave the way for the research questions I attempt to answer.

RQ1: To what degree are hedging and boosting devices used in university press releases?

RQ2: How do results compare with the scientific articles that the press releases report?

In order to answer these RQs, a list of devices functioning as hedges and boosters was selected, as will be shown below, alongside the phases of the study.

### 3.2 Method and corpora

This corpus-based study draws on two subcorpora. One comprises 30 scientific articles (SCAR) and the other 30 university press releases (UNREP). Each press release springs from a scientific article, so each element of one subcorpus corresponds to an element of the other. The total number of words is approximately 205,000 for scholarly papers and about 24,200 for press releases (see Table 1). This study moves in line with research investigating language characteristics of university press releases at different levels (Di Ferrante et al. 2021; Petrocelli et al. 2022), which are believed to be a sub-genre of the hybrid genre of corporate press releases (Jacobs 1999; Bhatia 2004; Catenaccio 2008).

**Table 1.** The composition of the corpora

	Number of texts	Number of words in total
Scientific articles (SCAR)	30	204,998
Press releases (UNREP)	30	24,185

The texts cover a wide range of topics in both soft and hard sciences (Biology, Earth Science, Medicine, Psychology, Economy and Marketing, Information Technology, Communication Science, and Education) to give a general outline of the characteristics of this type of texts across the horizontal dimension of variation of ESP (Garzone 2020).

A group of hedge words and booster words were identified and investigated in the corpus. These belong to different word classes and were chosen as being the most recurrent in scientific research articles. The list was created with a primary focus on the lexical level of hedging and boosting, acknowledging that not all words may have one form-meaning match but are polyfunctional expressions, like

many pragmatic markers. The use of boosters was compared to that of hedges, being the former – as previously said – at the opposite side of an ideal continuum along maximum degrees of detachment (plausibly conveyed by hedges) and maximum degrees of commitment (by ways of boosting devices).

This study adopts Hyland's (1998b; 1998c) taxonomy with cross-reference to studies related to academic writing to account for the most frequent forms of interaction between the authors and their audience within the social community involved in the writing of disciplinary knowledge (e.g. Aull & Lancaster 2014; Aull, 2019). This choice is based on this research's objective to explore how academic discourse migrates into the textual strategies of university PRs, so the accountability of hedges and boosters typical of EAP writing was fundamental. It is worth mentioning that hedges and boosters in the present work were not derived from studies on science news or press releases, since most studies on the topic mainly concern content analysis (e.g., Pellechia 1997; Tankard & Ryan 1974; Stocking 1999) or discourse-based hedges (Woloshin & Schwartz 2002; Sumner et al. 2016; McLaren-Hankin 2008) more than lexical ones as this study does, or - when doing so - they still refer to Hyland's work (e.g. Jensen 2008; Lui & Zhang 2021). Finally, this taxonomy, with some degree of variance, was also used in Ghia et al. (2022: 53-54) with similar premises in the structure of the rationale but different research goals.

All in all, the following hedges were targeted:

- modal verbs of tentative epistemic possibility *might/may/could*;
- four lexical verbs commonly used as hedges and divided into two categories: speculative judgmental verbs *suggest* and *indicate*, and the sensory evidential verb *seem*;
- epistemic stance adverbs *possibly*, *generally*, *in general*, *slightly*, and *perhaps*;
- epistemic adjectives *possible* and *likely*.

A set of boosters was analysed and confronted with the hedges.

- modal verbs *can* and *must*; epistemic *will*;
- adverbs *certainly*, *absolutely*, *definitely*, *clearly* and *undoubtedly*;
- the verb *demonstrate*.

A close analysis of the occurrences was necessary when looking at the concordance lines to validate whether each item carried out the functions of hedges or boosters. For example, occurrences where *likely* was used as an adverb were also counted since they cover the same hedging function as when the item is an adjective. Modal verbs aiming to lower the assertive level of a proposition or create generalisations were included (cf. Aull et al. 2017), differently from instances where, for example, uses of “could” expressing a dynamic modality appeared (*We conducted a recruitment survey of every entrepreneur who could speak conversational English* in SCAR) instead of an epistemic one (*We suggest that, as a possible solution, experienced professionals could volunteer time to guide emerging-market entrepreneurs*



in SCAR), or where *may* appeared in dates and occurred as a noun. *Must* was selected when expressing inferential certainty (Coates 1983; Hyland 1998a: 106) and *can* when indicating a solid possibility (Biber et al. 1999: 492). Uses of *will* expressing volition were not considered, unlike those featuring unhedged predictions (Pindi & Bloor 1987: 58; Hyland 1998b). Likewise, adverbial hedges were deleted when part of an attribute to the copula verb, or of an adjective phrase (*to address a clearly identified market opportunity* in SCAR) and only considered when used in code glosses to make discourse clear and direct (*this imbalance clearly warrants attention* in SCAR).

The subcorpora were searched individually, and the occurrences were analysed using Sketch Engine's concordance tool (Kilgarriff et al. 2014; <http://www.sketchengine.eu>). Alongside an analysis of concordances, descriptive and inferential statistics were used to determine the degrees of variation in the quantitative use of hedges and boosters across the two corpora.

Discourse analysis was then conducted to enforce the understanding of how writers navigate the balance between asserting their findings and acknowledging uncertainties. It also explored how meaning is constructed in the scholarly and popularised versions. This examination aimed to observe the shape of this textual metamorphosis, assessing whether the use of hedges and boosters contributes to the change and influences subtle or more substantial modifications in the content or the type of message being conveyed. A qualitative approach was used, following different steps. First, I applied close reading to each pair of texts, focusing on the language and rhetorical strategies used to express key findings, conclusions, implications and limitations. Then, I considered each text's broader context and the intended audience. Mostly, I looked at the levels of assertiveness of the language to identify how hedges and boosters were employed and understand how these features contribute to the overall communication strategies in the two genres.

The following sections illustrate the findings.

## 4. Results

### 4.1 Occurrence of hedges and boosters in press releases (UNREP)

To start investigating the range of hedges used and their frequency of occurrence, each type was analysed and differentiated by category. Table 2 shows raw frequency values followed by normalised frequency per million words (p.m.w.).

Table 2. Target hedges in UNREP

Hedge Category	Specific hedge	Raw frequency	Normalised frequency (per million words)
Modal verb (tentative possibility)	<i>may</i>	35	1,211.70
Modal verb (tentative possibility)	<i>might</i>	10	346.20
Modal verb (tentative possibility)	<i>could</i>	26	900.12
Epistemic stance adverb	<i>possibly</i>	0	0,00
Epistemic stance adverb	<i>generally</i>	3	104.26
Epistemic stance adverb	<i>in general</i>	0	0,00
Epistemic stance adverb	<i>slightly</i>	0	0,00
Epistemic stance adverb	<i>perhaps</i>	1	35.02
Epistemic adjective	<i>likely</i>	30	1,038.60
Epistemic adjective	<i>possible</i>	5	173.10
Epistemic lexical verb, judgemental, speculative	<i>suggest</i>	22	762.04
Epistemic lexical verb, judgemental, speculative	<i>indicate</i>	5	173.10
Epistemic lexical verb, evidential, sensory	<i>seem</i>	10	346.20

The most common hedge types in UNREP are modal verbs, and this is consistent with previous research (Hyland 1994, 1998a). *May* is the most frequent (1,211 p.m.w.), followed by *could* (900 occurrences p.m.w.). *Might* has the lowest number of hits (346 p.m.w.).

The hedge *likely* is used extensively in the subcorpus UNREP, with 1,038.6 hits per million words. It is used most prevalently as an adjective but also as an adverb, as in what follows:

- (1) for reasons that are still unclear, people are more **likely** to share a piece of fake news than real news. The findings have important policy implications, the researchers argue,
- (2) While pandemic-induced economic shocks will **likely** have little direct effect on long-term emissions, they may well have a significant indirect effect on the level of investment.

Likewise, noteworthy is the vast presence of the epistemic lexical verb *suggest* (762.04 p.m.w.), which frequently appears in n-grams like *findings suggest / the new study suggests / there is evidence to suggest*, as in the following:

- (3) Our **findings suggest** that decreasing urban population densities in India and Nigeria since 1970 caused 85 percent and 30 percent more land,

The item also appears in combination with boosters, like in the example below, which diminishes the hedging effect.

- (4) The results **clearly suggest** a bidirectional influence between people’s weight status, psychology and responsiveness to the environment.

Epistemic stance adverbs *possibly, in general, slightly* never appear in the corpus, whereas *generally* and *perhaps* occur rarely (respectively 104.26 and 35.02 p.m.w.). The three occurrences of *generally* modify verb phrases (5) or noun phrases (6).

- (5) Such low density development whether in the U.S. or anywhere else **generally** means inefficient use of resources.
- (6) While it may be justified for organic agriculture products, for example, it is not a **generally** valid principle, according to study co-author Eric Lambin, a Stanford professor of Earth system science.

**Table 3.** Target boosters in UNREP

Booster category	Specific booster	Raw frequency	Normalised frequency (per million words)
Modal verb	<i>can</i>	62	2,146.44
Modal verb	<i>must</i>	2	69.24
Modal verb	<i>will</i>	30	1,038.60
Adverb	<i>certainly</i>	4	138.48
Adverb	<i>absolutely</i>	1	35.02
Adverb	<i>definitely</i>	0	0,00
Adverb	<i>clearly</i>	4	138.48
Adverb	<i>undoubtedly</i>	0	0,00
Lexical verb	<i>find</i>	68	2,354.16
Lexical verb	<i>demonstrate</i>	3	104.26

In both active and passive voice, *can* is the most widely used when expressing logical possibility. Epistemic uses of *will* follow, while *must* rarely appears in its epistemic meaning.

Adverbial boosters are not used as frequently: *definitely* and *undoubtedly* never appear; *certainly* and *clearly* are used more extensively, the former either as a sentence connector or a modifier to an adjective phrase.

A very interesting result in the UNREP corpus lies in the occurrence of *find*, which is pretty extensive (2,354.16 p.m.w.). This is in line with Petrocelli et al. (2022), who reported frequent hits of the n-gram *the study finds/found* to introduce the novelty of the research (7) or additional data, occurring with *also*. There are considerable mentions of the agents, like *the researchers/research teams* (8).

- (7) **The study found** that participants reported significantly lower levels of face-to-face, voice and email interactions.
- (8) **The researchers found** that everyone underestimated the calorie content of snacks that were framed as healthy.

The booster *demonstrate*, conversely, occurs little, also with the adverb *consistently*, which accentuates the boosting effect, as in (9).

- (9) Across six experiments that tested their hypotheses, [...] **consistently demonstrated** that scarcity leads to more novel product usages “without compromising the appropriateness of the consumption solutions,” according to the paper.

#### 4.2 Occurrence of hedges and boosters in scientific articles (SCAR)

The same search was carried out for scientific articles (SCAR) and it shows the following results in terms of raw and normalised frequency (Table 4):

**Table 4.** Target hedges in SCAR

Hedge category	Specific hedge	Raw frequency	Normalised frequency (per million words)
Modal verb (tentative possibility)	<i>may</i>	432	1,619.38
Modal verb (tentative possibility)	<i>might</i>	119	446.08
Modal verb (tentative possibility)	<i>could</i>	207	776.35
Epistemic stance adverb	<i>possibly</i>	8	29.99
Epistemic stance adverb	<i>generally</i>	44	164.94
Epistemic stance adverb	<i>in general</i>	14	52.48
Epistemic stance adverb	<i>slightly</i>	23	86.22
Epistemic stance adverb	<i>perhaps</i>	19	71.22
Epistemic adjective	<i>likely</i>	149	558.54
Epistemic adjective	<i>possible</i>	93	349.02
Epistemic lexical verb, judgmental, speculative	<i>suggest</i>	289	1,083.33

Hedge category	Specific hedge	Raw frequency	Normalised frequency (per million words)
Epistemic lexical verb, judgmental, speculative	<i>indicate</i>	166	622.26
Epistemic lexical verb, evidential, sensory	<i>seem</i>	51	191.18

The use of modal verbs as hedging devices is extensive in SCAR, like in UNREP. Examples 10, 11, and 12 explain how their concordances appear in main and circumstantial clauses.

- (10) As previous research indicates, hedonic gratification is a crucial element that **could** explain why people use commercial websites (Stafford et al., 2004), cellphones (Wei & Lo, 2006), or mobile messaging.
- (11) The 41 targets evaluated as ‘unknown’ in this work **may** nevertheless still have roles to play in affecting the natural environment.
- (12) The first step in determining how big these effects **might** be is to identify the base level of emissions from that activity or sector.

Data highlight the extensive use of epistemic adverbs and adjectives, surpassing the modal verb occurrences. In particular, *likely* is used extensively as an adjective and an adverb.

Lexical verbs are also amply used in SCAR, especially *suggest*, both as a predicate (13) and as a circumstantial clause (14) with 1,083.33 hits p.m.w, and *indicate* with 622.26 hits (15), in n-grams like *authors indicate*, or *values indicate*, as in 15.

- (13) occasional records **suggest** potentially mixed or even beneficial impacts of roads (Kaczan, 2020), but such evidence is relatively weak.
- (14) Other researchers concurred, **suggesting** that SET are influenced by a number of factors such as instructor gender, instructor ethnicity.
- (15) Values less than and greater than zero **indicate** a student gave more negative or positive responses, respectively, on the 14 item TA SET.

As for boosters, these generally occur to a lower extent than hedges, which fulfil a more pervasive function (table 5).

**Table 5.** Modals *can*, *must* and *will* in SCAR

Category	Specific booster	Raw frequency	Normalised frequency (per million words)
Modal verb	<i>can</i>	374	1,401.96
Modal verb	<i>must</i>	31	116.10
Modal verb	<i>will</i>	222	832.18

*Must* is the least present modal verb with a boosting function in the corpus (116.1 hits p.m.w.), similar to UNREP. Modals *can* and *will* are the most frequent.

**Table 6.** Boosters (adverbs and lexical verbs) in SCAR

Category	Specific booster	Raw frequency	Normalised frequency (per million words)
Adverb	<i>certainly</i>	3	11.25
Adverb	<i>absolutely</i>	0	0
Adverb	<i>definitely</i>	2	7.50
Adverb	<i>clearly</i>	16	60.38
Adverb	<i>undoubtedly</i>	4	15.39
Lexical verb	<i>find</i>	231	866.32
Lexical verb	<i>demonstrate</i>	106	397.35

The most common lexical adverb is *clearly* (60.38 hits p.m.w.), used to emphasise the straightforwardness of data, as in (16).

(16) Figure 2 **clearly** shows the pronounced seasonal variation in food insecurity in both Bangladesh (Fig. 2A) and Nepal (Fig. 2B).

Compared to UNREP, *find* (866.32 occurrences p.m.w.) is also recurrent in SCAR, but this time, it presents itself in n-grams stressing self-authorship with deictics like *this study finds* (17) or first person pronouns like *we* (18).

(17) **this study finds** that anti-mask groups practice a form of data literacy in spades. Within this constituency, unorthodox viewpoints do.

(18) **we find** that the anti-mask community exhibits very similar patterns to the rest of the networks in our dataset.

#### 4.3. A comparison between the two corpora through statistical analysis

A z-test was chosen for inferential statistics analysis since the sample was large and had known variance. The aim was to determine the quantitative use in SCAR

and UNREP and thus to understand if hedges and boosters could be addressed as discriminating features of the two genres and at what level.

Table 7 shows descriptive statistics for hedges. The value of  $p = < 0,002838$  makes it possible to highlight that hedging can be regarded as a discriminating element of the two corpora. As argued before, scientific articles could be located at the very end of an ideal vertical continuum of variation based on the level of specialised and formal language uses (see Cloître and Shinn 1985; Garzone 2020). Data seem to suggest that cautious propositions characterise scientific articles more than the press releases that spring from them, and this shows through the quantitative use of hedges.

**Table 7.** Descriptive Statistics (Hedges)

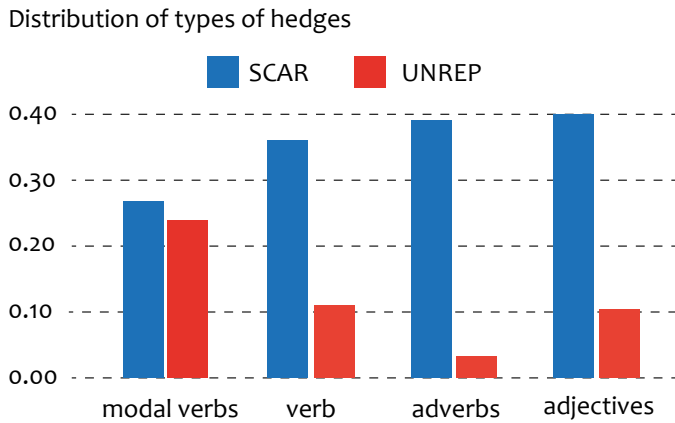
	<b>Texts</b>	<b>Average number of words per text</b>	<b>Average number of hedges per text</b>	<b>Percentage of hedges on all words</b>	<b>Total number of hedges</b>	<b>Total number of words</b>
Scientific papers	30	6,833	53	0.78%	1,614	204,998
Press releases	30	806	5	0.60%	147	24,185

Conversely, the confidence and commitment conveyed by boosting devices tend to permeate university press releases, coherently with the still little research carried out in the field of metadiscourse for this specific sub-genre (Di Ferrante et al. 2021; Petrocelli et al. 2022). The percentual presence of boosters is 0.71% in UNREP and 0.48% in SCAR. The z-test results show a statistically significant variation in the use of boosters, which is more pervasive in PRs ( $p = < 0,0001$ ). It is, therefore, particularly striking to consider that although the press releases in UNREP spring out from the corresponding scientific articles in SCAR, their use of boosters varies, suggesting a tendency of propositions towards a higher level of directedness and bluntness.

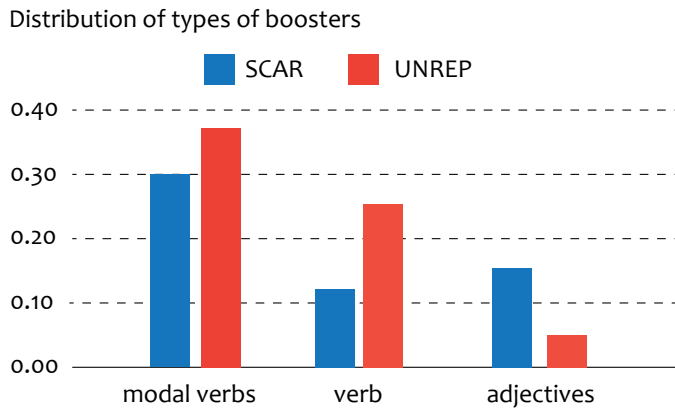
**Table 8.** Descriptive Statistics (Boosters)

	<b>Texts</b>	<b>Average number of words per text</b>	<b>Average number of boosters per text</b>	<b>Percentage of boosters on all words</b>	<b>Total number of boosters</b>	<b>Total number of words</b>
Scientific papers	30	6,833	32	0.48%	989	204,998
Press releases	30	806	6	0.71%	174	24,185

The analysis of the distribution of types of hedges (chart 1) highlights that while modal verbs are used substantially in both corpora, the remaining types of hedges are more widely used in scientific texts, signalling a higher range of use of metadiscourse devices. This slightly varies in boosters (chart 2), where the use of modal and lexical verbs is higher in UNREP. Boosting adverbs, instead, are used more extensively in scientific articles.



**Chart 1.** Distribution of types of hedges in SCAR and UNREP



**Chart 2.** Distribution of types of boosters in SCAR and UNREP

By looking at the frequency of hedges across the two corpora, it comes out that hedges are more frequent in scientific articles and that this trend concerns all categories except for the items *could* and *likely* (chart 3).

Z-test statistics show a significant difference between the two corpora for epistemic stance adverbs ( $p = < 0,02435$ ) and lexical verbs ( $p = < 0,005621$ ). Conversely, the use of epistemic modal verbs ( $p = < 0,0703$ ) and epistemic adjectives ( $p = < 0,3025$ ) do not vary significantly.



Looking at the distribution of boosters (chart 4), we find a prevalent use of *can* and *will* in UNREP. *Must* is more prevalent in SCAR. As for frequency, the two corpora differ significantly in the use of the three types of modal verbs ( $p = < 0,03449$  for modal verbs). Adverbial boosters prevail in SCAR, although *absolutely* only occurs in UNREP and *certainly* pervades the corpora equally. Statistically significant differences emerge in the use of adverbial ( $p = < 0,006104$ ) and verbal ( $p = < 0,0001$ ) boosters.

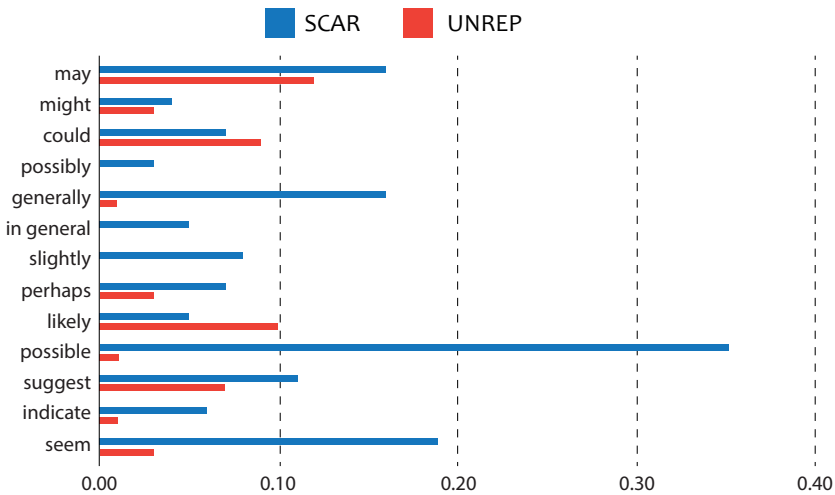


Chart 3. Frequency of hedges in SCAR and UNREP

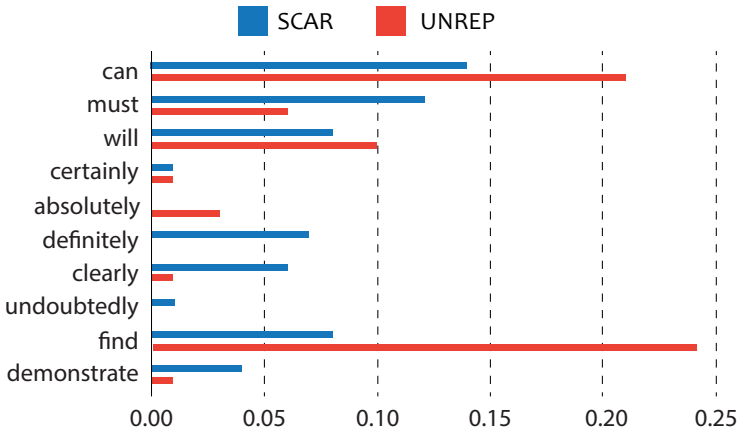


Chart 4. Frequency of boosters in SCAR and UNREP

#### 4.4. A comparison between the two corpora through discourse analysis

The contexts in which hedges and boosters appear in scientific articles and their corresponding popularised pieces to convey the same content were compared.

This was done to learn how scientific information is framed for different audiences. To carry out this type of investigation, it would have been restrictive to only devote attention to those hedges and boosters inserted in the taxonomy shown above, so all forms carrying out this function were searched. Some examples will be shown to showcase the shapes of this transmigration of content from the source text to the press release to provide insights into the rhetorical strategies employed.

While boosting and hedging devices were not found to be meaningfully inserted in specific parts of the press releases, as for scholarly articles, hedges and boosters seemed to be nested in the abstract, discussion, results, limitations and implications sections, and fewer were found in the literature review and methodology parts. This phenomenon may be addressed to the more factual nature of these two sections, as opposed to the others, involving interpretation, discussion, and generalisation, which by nature require caution and acknowledgement of uncertainties and limitations. In particular, an interesting result is that, in most scientific texts, hedges tend to be mostly concentrated in the section devoted to results and discussion.

For example, CAT010-SCAR discusses the impact of the COVID-19 pandemic, its potential long-term effects and its influence on factors like air travel, urban transit, supply chains, virtual services, and energy consumption. The paper's discussion section is framed by more hedging devices and fewer boosters, as shown below.

#### CAT010-SCAR

Also, a residual fear of crowding could have a lasting effect on air travel and urban rapid transit. Less clear but also potentially significant, the disruption of supply chains during the pandemic could lead countries to take measures that will restrain international goods trade. Increased experience with virtual shopping, banking and entertainment could accelerate changes in the service sector, with fewer “brick and mortar” buildings (and lower energy use) but possibly more transportation emissions from delivery services. What is the potential magnitude of these structural changes? It is very early, and hard to tell whether changes will be permanent or transitory. Or, a reduction in one activity might lead to increases in others that are just as emissions intensive or more so. For example, when a vaccine becomes widely available there could be burst of leisure travel from those tired of being at home.

When comparing how the same information is told in the correspondent PR (CAT010-UNREP), we find a substantially minor use of hedges.

#### CAT010-UNREP

Business closures. Travel restrictions. Working and learning from home. These and other dramatic responses to Covid-19 have caused sharp reductions in economic activity – and associated fossil fuel consumption – around the world. [...]

While the pandemic may have accelerated progress toward these targets over the past year, will that trend continue through this decade and beyond?

According to a new study in the journal *Humanities and Social Sciences Communications*, the answer to that question will depend, in part, on the pandemic's long-term effect on economic activity and energy use around the world.

Although the core content and themes align, the language and style differ. In the scientific article, we read more cautious statements. Phrases such as *residual fear*, accompanied by hedges like *could have*, and attributes like *less clear but also potentially significant*, introduce elements of uncertainty. The careful approach is confirmed by phrases like *possible magnitude* or expressions with a hedging function like *hard to tell whether changes will be permanent or transitory*. Conversely, in the press release CAT010-UNREP, the statements about business closures, travel restrictions, and working from home are presented without hedging. The language in this excerpt is more direct and focused on delivering clear information. In general, and most prevalently across the corpus of press releases, on occasion, the assertiveness of the statement is only enhanced by the strict choice of the Simple aspect and the active voice, which does not allow for the typical depersonalisation of scientific prose.

Another example of the discursive difference between scholarly articles and academic press releases is traceable in the 015 pair. The two excerpts below convey similar information, but nuanced differences are created by the expressions used.

#### CAT015-SCAR

##### Discussion

We demonstrate that highs mix and match high and low items partly to distinguish themselves from middles. We do not suggest that this is the only driver of the effect, as other factors may also encourage high-status adoption of lowbrow tastes.

#### CAT015-UNREP

Through a series of experiments, Bellezza and Berger demonstrate that high-status individuals, and the luxury brands that cater to them, mix and match high-end and low-end tastes to distinguish themselves from the middle class.

The scientific article (CAT015-SCAR) uses hedges more explicitly, introducing nuanced language to convey the researchers' caution and acknowledge potential complexities. Instead, the press release (CAT015-UNREP) seems to opt for a more direct and assertive style, potentially enhancing readability and accessibility for a broader audience. In the scholarly article, despite the unexpected boosting expression *we demonstrate* at the beginning and the personalisation of the agent, the authors carefully hedge their argument with *We do not suggest that this is the only driver of the effect* to cover their bases. Also, the use of *partly* in

*partly to distinguish themselves from middles* introduces a degree of uncertainty. In CAT015-UNREP, we can see uses of more accessible language (high-status individuals instead of highs), and most importantly, we find no hedging attempt to mitigate the assertive expression *Through a series of experiments, Bellezza and Berger demonstrate*, as the researchers tried to do in their article.

The example above shows a general tendency: boosters (primarily variations of *find* or *demonstrate* or modals like *can* and *will*) are almost always accompanied by hedges in scientific articles. However, in the respective press releases, we tend to find less frequent use of hedges to express the same concepts. This is also evident in the following excerpts, where both texts discuss the impact of higher temperatures on child diet diversity and, consequently, on issues like malnutrition and low-quality diets.

#### CAT002-SCAR

(Abstract)

It is widely anticipated that climate change will negatively affect both food security and diet diversity. [...] We find that higher long-term temperatures are associated with decreases in overall child diet diversity [...] we find that five have significant reductions in diet diversity [...] These results suggest that warming temperatures and increasing rainfall variability could have profound short- and long-term impacts on child diet diversity, potentially undermining widespread development interventions aimed at improving food security. [...]

(Discussion) [...]

Most importantly, we find that climate factors, especially temperature, have a greater relative negative impact on diet diversity [...] We also find that overall child diet diversity within the study is very low [...] This provides new and broad geographic evidence that both long-term warming temperatures and acutely hot years may have consistently negative impacts on diet diversity, which in turn also may negatively affect child stunting and wasting. There are likely both direct and indirect pathways that influence this relationship.

#### CAT02-UNREP

A first-of-its-kind, international study of 107,000 children finds that higher temperatures are an equal or greater contributor to child malnutrition and low quality diets than the traditional culprits of poverty, inadequate sanitation, and poor education [...] The study finds that the negative impacts of climate—especially higher temperature—on diet diversity are greater in some regions than the effects of education, water and sanitation and poverty alleviation—all common global development tactics.

In the paper CAT002-SCAR, phrases like *we find* in the abstract and, *most importantly, we find* in the discussion section emphasise the key results. This boosting approach is softened by using cautious language, as *it is widely anticipated* to convey the general expectation about climate change's negative effects, and *these results suggest*. In contrast, in the corresponding press release, the assertive use of

expressions, such as *finds that higher temperatures are an equal or greater contributor* is not softened by explicit hedges. Instead, emphasis is put on the study's uniqueness as a *first-of-its-kind, international study*.

Sometimes, the greater boosting strategy in press releases comes with the attempt to create messages more likely to capture the readers' attention. This is sometimes done at the expense of rigour in the content transmitted, which is evident in the following texts.

CAT037-SCAR

Implications

[...] First, our results suggest that political candidates should be cautious about using informal communication on their social media channels. While their intentions may be to increase accessibility and relatability, we find that informal communication may lead to detriments in perceptions of credibility and willingness to support these candidates. [...]

Despite these limitations, we believe that this study poses interesting theoretical and practical implications for political candidates who use informal communication with their constituents.

CAT037-UNREP

Political candidates' use of humor on social media could sometimes backfire on them with potential supporters, new research suggests.

People were more likely to view messages using humor as inappropriate for a political candidate they didn't know, the study found. That led participants to rate a candidate using humor as less credible than one who didn't – and less likely to get their vote. [...]

Overall, the findings suggest that candidates should be mindful of their audience on social media, particularly when they're first starting out, Bullcock said. "People have certain expectations of political candidates and they need to keep those in mind when they are communicating."

Overall, we notice the same discursive patterns shown above. For instance, CAT037-SCAR uses a more formal language and structure, the statement *our results suggest*, and the phrase *despite these limitations* introduces a level of caution and acknowledges the study's limitations. As opposed to that, CAT037-UNREP uses a more concise and direct style: forms like *the study found* and *overall, the findings suggest* are straightforward, providing a clear presentation of the research results, suitable for a broader audience. The difference that mainly stands out, however, is the following. Both texts deal with the effects of political candidates' language use, especially on social media, on perceptions of credibility. CAT037-SCAR focuses on *informal communication on social media channels* and discusses the potential harm to perceptions of credibility caused by informal communication style. Humour is mentioned in the study as part of informal communication. Instead, CAT037-UNREP emphasises *political candidates' use of humor on social media*. It highlights that messages using humour may be considered inappropriate, and this might lead to a loss of credibility and support. So, while the main focus of the study is on the caution against using informal language, the press release

emphasises humour specifically. This might be because a topic like humour tends to grab more attention than informal communication and is an engaging element that people can easily understand and relate to. The main goal could be to draw attention to a topic that more likely increases visibility and interest in the study.

It should be noted that the dissonance between scientific articles and press releases regarding hedges and boosters is frequent but not always present. For example, the manner of presenting the same information does not vary much between the two texts below.

#### CAT09-SCAR

The researchers found that nearly half of the most-popular videos from kid influencers (42.8 percent) promoted food and drinks. [...] The videos featuring junk food product placements were viewed more than 1 billion times—a staggering level of exposure for food and beverage companies [...] The researchers encourage federal and state regulators to strengthen and enforce regulations of junk food advertising by kid influencers. “We hope that the results of this study encourage the Federal Trade Commission and state attorneys general to focus on this issue and identify strategies to protect children and public health [...]”.

#### CAT09-UNREP

A total of 179 (42.8%) videos featured food and/or drinks, and food and/or drinks appeared 291 times during those 179 videos (Table 2). The 179 videos that featured food and/or drinks were viewed 1 billion times and generated 2.6 million likes on YouTube.

[...] These estimates, coupled with the current findings, demonstrate an urgent need to reduce unhealthy food and drink product placement in videos featuring and targeting young children. [...]

Both texts convey similar information about the promotion of food and drinks in videos with kid influencers. Both CAT09-SCAR and -UNREP use key findings without extensive use of hedging. Precise numbers and percentages are given in SCAR, and the expression *These estimates, coupled with the current findings, demonstrate an urgent need* does not lack assertiveness, just like CAT09-UNREP, where *viewed 1 billion times* and *demonstrate an urgent need* serve as boosters to stress the significance of the results.

## 6. Conclusion

The comparison between scientific articles and their correspondent press releases, published by the universities of the affiliated authors, sprung out from the consideration of two factors: 1) PRs are an elaboration of the content communicated in the scholarly papers; 2) scientific articles aim at the transmission of science mainly to the scientific community whereas PRs are functional to the popularisation of science to laypeople and, presumably, journalists. While the main aim of scientific articles is to inform about research, that of press releases is to

disseminate knowledge, adding a promotional attempt to the information given.

Considering these premises, this study is based on two hypotheses. The first one is that there will be some degree of permeation of the textuality of scientific articles into their popularised pieces. The second one is that the different purposes of the two distinct genres will manifest in different levels of engagement towards the claims made. Being hedges and boosters devices of metadiscourse used to tune the level of commitment and detachment of propositions and express various degrees of assertiveness, they were chosen as the linguistic focus of this research.

All these considerations lead to elaborating the following research questions, which will be answered below.

RQ1: To what degree are hedging and boosting devices used in university press releases?

RQ2: How do results compare with the scientific articles that the press releases report?

As for RQ1, inferential statistics guided the conclusion that boosters characterise PRs more than hedges do. Overall, modal verbs like *can* or *will* are more widely used in popularised pieces and adverbs like *absolutely* occur exclusively in this type of text. Moreover, the prevalence of occurrences of the lexicalised verb *find* in n-grams like *the study (also) finds/found* or *the researchers/research teams found*, is consistent with what was suggested in former research (Petrocelli et al. 2022) and with the assertiveness that press releases seem to aim to when introducing the results or the data of an article. However, hedging devices are present in the analysed press releases, which explains that the characteristic trend of academic discourse (Hyland 1998a) permeates this type of popularisation of science. Moreover, the promotional attempt that university press releases inherit from the corporate ones carefully modulates commitment and detachment in that promotion and persuasion are favoured when the author negotiates with the audience and does not impose. As Dafouz-Milne 2008 states, “The key to an effectively persuasive text is the artful combination of weakening expressions (i.e. hedges) and strengthening ones (i.e. certainty markers and/or attitudinal markers) with the final intention of producing a discourse that is neither too assertive nor too vague” (p. 108). Strikingly, no significant variance was found in the use of epistemic modal verbs and adjectives, the former being the type of hedging device more widely used across the two corpora. Nevertheless, in UNREP, hedging does not tend to be used with a high range of devices: modal verbs are, in fact, the most prevalent type, to the point that the occurrences *could* surpass those in SCAR. One exception is made by *likely*, which is used both as an adjective and less frequently as an adverb. The abundant use of this lexeme in UNREP might have contributed to the non-significant variation of epistemic adjectives across the two corpora. Also, the lexical verb *suggest* is used frequently, although it does not exceed the frequencies in SCAR, as *likely* does.

As for RQ2, inferential statistics showed that the differences in the quantitative use of hedges are a discriminant factor between the two genres. The frequency

is higher in scientific articles, which aligns with studies suggesting that academic writing is characterised by some strategic boosters and a higher degree of hedges overall, with attitudes of approximation to enhance reliability and appreciation (e.g. Biber et al. 1999: 557; Hyland 1998a; Aull 2015; Lancaster 2014, 2016).

All in all, a wider range of hedge items is used in SCAR. Hedges like *generally*, *possibly*, *slightly* and *in general* are used either exclusively in SCAR or more extensively. The same happens for the booster category with *definitely*, *clearly* and *demonstrate*.

Discourse analysis confirmed what inferential and descriptive statistics suggested. More formal and cautious language uses are traceable in scholarly papers, alongside explicit forms of hedges. In contrast, press releases show a more direct style, with simpler forms and a more assertive tone to report on research. The differences that emerged in language style between scientific articles and press releases are coherent with the two genres' specific purposes, intended audiences and communicative goals. Each genre strategically adapts to cater to the needs and expectations of its public and operating context.

To conclude, data seem to confirm the hypotheses: academic discourse characterised by the use of hedges migrates into the textual discourse strategies of university PRs, which overall is more strongly connoted by the bolder stance conveyed by boosters.

This careful balance is probably due to an attempt to promote research among laypeople and journalists in a way that convinces them of the university's study's value, balances the need for clarity with the inborn uncertainties of rigour, and keeps the reliability of a research institution, with some degree of detachment to the propositions made.

Since this study is based on two small-sized corpora, limitations regarding the comparability of results must be acknowledged. Further research might be extended onto a more extensive reference corpus and include a broader range of hedging and boosting items.

## Notes

- <sup>1</sup> The publication has been produced during research carried out at the University for Foreigners of Siena with co-financing from the European Union – Next Generation EU for the project Ecosistema dell'Innovazione – THE – Tuscany Health Ecosystem. CUP: E63C22001050001.

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