

Research Article

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Hedging with modal auxiliary verbs in scientific discourse and women's language

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Abstract: This Critical Discourse Analysis examines hedging as a linguistic device at the intersection of scientific discourse and women's language. Hedging has been identified as a marker of scientific discourse where it is valued for expanding dialogic space for the promulgation of knowledge. It is also a recognised marker of women's common language, where it is purported to align with discriminatory gender norms that women should not impose their views but could also be construed as a lack of clear thinking, conviction, or confidence. This could be limiting, especially in professional domains, however, the particular value attached to hedging in scientific discourse challenges this hypothesis and provides the focus of this study of gender differences in hedging with modal auxiliary verbs in the context of scientific discourse. The findings confirm hedging as a marker of scientific discourse and reflect modal auxiliaries being used with similar frequency by women and men, although with subtle, but significant differences in the specific modals that were used, and how. This provides a nuanced picture of women hedging in ways that mostly exemplify the standards of scientific discourse while also integrating some of the socially normative hedging practices that are associated with women's language.

Keywords: Corpus Linguistics, Critical Discourse Analysis, gender, gender performance, hedges, modal auxiliary verbs, scientific discourse

1 Introduction

This corpus-based Critical Discourse Analysis (CDA) explores gender-based differences in lexical hedging, with specific focus on the use of modal auxiliary verbs. Hedges introduce a degree of uncertainty and caution into a sentence which can signal that the speaker/writer is not entirely convinced of what they are saying/writing or that they do not wish to give the impression of imposing their point of view on their interlocutor. This latter use is associated with normative notions of politeness and also serves to expand dialogic space for different opinions and ideas to be considered and explored.

Hedging has been identified as a marker of scientific discourse (Hyland 1996, 1998, Markkanen and Schröder 1989, 1992, cited in Markkanen and Schröder 2010, 5, Salager-Meyer 2011) and is associated with a trained scientific gaze because it enables knowledge to be negotiated in ways more likely to be ratified within the peer group (Salager-Meyer 2011, 35–6) by following established conventions that claims are made tentatively to create space for discussion and are not seen to directly challenge the knowledge and positions of the interlocutor, but rather invite constructive input and debate. Hedging plays a similar role in the conventions of academic discourse, but this is not the focus of this study.

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Beyond the rather specific application of hedging in academic and scientific domains, it also occurs broadly in common discourse to express “tentativeness and possibility” (Hyland 1998, 433) and has been identified, notably by Lakoff (1973), as a particular marker of the discourse of women. Lakoff, in her groundbreaking work examining “women’s language” (1973, 1975), reflects on women being socialised to hedge because they are not permitted to confidently know. Agentic behaviour is normatively tolerated – or even encouraged – in men, but censured in women who, by virtue of their role in the reproduction of the species, are expected to be nurturing, communal, and conciliatory. Paying particular attention to complying with norms of politeness is an important dimension of this, and this can include the expectation that women hedge to avoid alienating their interlocutors by being seen to impose their points of view. This hedging can have the effect that the discourse of women comes across as lacking conviction and clarity or, if they do not hedge, that they are pushy and unfeminine. It is a dilemma that is very different to scientists hedging to get their ideas and thinking recognised, developed, and ratified, and thereby enhance their personal power, prestige, and standing within their fields.

The starkly contrasting role of hedging apparent in the specialised discourse of science and the common discourse of women forms the critical focus of this research, provoking the following research questions:

1. Do the patterns of hedging by scientists who identify as women differ from their peers who identify as men, in terms of hedging type, frequency, collocation and concordance?
2. To what degree do the patterns of hedging by scientists who identify as women suggest skilful use of hedging in line with established conventions of scientific discourse, and/or encode submissiveness that may be interpreted as reflecting inequality and oppression?

The study is corpus-based in that it is based on the qualitative analysis of transcripts of public meetings held by the Presidential Commission for the Study of Bioethical Issues (Bioethics Commission), active from 2009 to 2017 as an advisory panel to the 44th President of the United States of America. The study focuses on the discourse of the commission members, who are leading scientific experts speaking in a formal setting, and thus could be expected to be subject to the conventions of scientific discourse, including expectations with regard to hedging utterances. The fact that five commission members identify as women and seven as men opened the possibility to examine the potential role of gender in how they respectively navigated these conventions in their discourse.

2 Theoretical framework

2.1 Lexical hedging and the “logic of fuzzy concepts” (Lakoff 1972)

To hedge, in the common sense of the word, implies softening a statement to introduce a degree of uncertainty or scepticism (Hyland, 1996, 434). Rather than a black-or-white bare assertion (Martin and White 2005, 99), hedging is a strategy that limits or qualifies meaning to shades of grey that serve several nuanced communication objectives. George Lakoff (1972) explored hedging as a linguistic concept in his influential work on “the logic of fuzzy concepts” (1972, 458–61), building on Zadeh’s “fuzzy set theory” (1965, cited in Lakoff 1972, 461–2). The Lakoffian definition of a hedge refers to lexical items that serve to clarify degrees of group membership, making topological connections between an object and group more or less “fuzzy” – more or less precise. A classic illustration of this logic is drawn from Heider’s “hierarchy of birdiness” (1971, cited in Lakoff 1972, 459), which ranks five statements of prototypical classification from most true to false:

- a. *A robin is a bird* (true)
- b. *A chicken is a bird* (less true than a)
- c. *A penguin is a bird* (less true than b)
- d. *A bat is a bird* (false, or at least very far from true)
- e. *A cow is a bird* (absolutely false)

(Lakoff 1972, 460)

Leveraging this hierarchy, Lakoff demonstrates how inclusion of the adverbial modifier “sort of” introduces “fuzziness” which shifts meaning:

- a. *A robin is a sort of a bird* (false – it is a bird, no question about it)
- b. *A chicken is a sort of a bird* (true, or very close to true)
- c. *A penguin is a sort of a bird* (true, or close to true)
- d. *A bat is a sort of a bird* (still pretty close to false)
- e. *A cow is a sort of a bird* (false)

(Lakoff 1972, 471)

The statement that “A penguin is a *sort of* a bird” is more true than “A penguin is a bird” because it acknowledges with the hedge “sort of” that the classification is a stretch: a penguin is further away from essential “birdiness” than the more prototypical robin. The hedge therefore makes the boundaries of classification more fuzzy and thereby the statement more plausible.

2.2 Hedges as “approximators [and] shields” (Prince/Frader/Bosk 1982, 1985)

Prince/Frader/Bosk (1982, 1985, cited in Markkanen and Schröder 2010, 5) differentiate between hedges that function as “approximators (e.g. *His feet were sort of blue*) and shields... (e.g. *I think his feet were blue*).” Approximators are classically fuzzy in the Lakoffian sense of “A penguin is a sort of a bird.” When new knowledge is proposed that stretches or challenges the *status quo*, an approximator anticipates and mitigates dissension, to help secure buy-in. With *approximators* “the *proposition* is...hedged” (Skelton 1988, 38). *Shields* on the other hand play a distinctly different role: “the *speaker* is hedged: his or her degree of commitment to a proposition is stated” (Skelton 1988, 38). The literal image of a shield exemplifies hedging as protecting face by anticipating and mitigating the possibility of dissension and being proved wrong. This can be taken further to apply not only to the speaker, but also to mitigate and shield the interlocutor, when a statement that is made that may challenge and/or disprove their beliefs (Hyland 1996). Hedging may soften a blow, so to speak, in the “delicate facework” (Hyland 1998, 5) of hedging to move discourse – especially tricky discourse – forward.

Approximators and especially *shields* are relevant to scientific discourse where “statements are rarely made without subjective assessment of their reliability and...claims need to be presented with caution and precision” (Salager-Meyer 2016, 35). Hedging as a specific feature of scientific discourse has drawn attention, notably from Skelton (1988) and Hyland (1996, 1998), as researchers have sought to unpack the ways that a linguistic device that expresses less than certainty and enables discourse in scientific fields that purport to seek the ultimate truth. The apparent contradiction inherent in employing uncertainty to achieve certainty – or at least relative acceptance – reflects scientists entering into what Skelton has coined as a “contract of inexactitude” (1988, 39), which is a hallmark of skilful scientific discourse.

2.3 Modal auxiliary verbs as hedges in scientific discourse (Hyland 1998)

Hyland (1998) identifies modal auxiliaries as the “most numerically significant” (1998, 102) surface features of hedging in scientific discourse. Modal auxiliary verbs have been observed to be even more prevalent in spoken, rather than written, scientific discourse (Flowerdew 1993, cited in Hyland 1998, 105). Given the concern of this study with the *spoken* discourse of experts in a field of *science*, hedging encoded in modal auxiliaries will therefore be the focus of this corpus-based CDA.

2.4 Hedging as a marker of *women's language* (Lakoff 1973, 1975)

Hedging has also been identified as a feature of language as used by women (Lakoff 1973, 1975), but unlike the specialised discourse just examined, there is striking lack of consensus as to whether women hedging is a good or bad thing.

In her seminal exploration of *women's language* (1973, 1975), Robin Tolmach Lakoff identified lexical hedges (worked examples: *you know, sort of, well, you see*), tag questions (*she's very nice, isn't she?*) and rising intonation on declaratives (*it's really good?*) as markers, especially of *spoken* female discourse (1973, 1975), and hypothesised that this hesitant, uncertain mode of speaking is the product of social norms around what it means to “[talk] like a lady” (Lakoff 2004, 43). Lakoff argues that there is greater social pressure on women to conform to notions of politeness – including the notion that one should not impose one's ideas on others (2004, 50) – than there is on men (2004, 43–51), and that this inequality is reflected in the frequency of hedging by women in common discourse. Given that hedging can “convey the sense that the speaker is uncertain about what he (or she) is saying or cannot vouch for the accuracy of the statement” (Lakoff 2004, 80), this tendency of women to hedge gives their discourse a sense of not being “fully legitimate” (Lakoff 2004, 79). However, if a woman does speak with conviction, she is at risk of being censored for being impolite – “a girl is damned if she does, damned if she doesn't” is how Lakoff sums it up (2004, 48).

2.5 Re-examining hedging in *women's language*, with a focus on Holmes (1990, 2008)

This depiction of hedging as a signifier of social inequality and even oppression is in stark contrast to the positive characterisation of hedging as a useful linguistic tool in specialised discourse. It is also arguably a highly subjective view, not least because that it is rooted in an unapologetically subjective approach – Lakoff states that “[the] data on which [she was] basing [her] claims have been gathered mainly by introspection” (Lakoff 2004, 46). Lakoff's provocative exploratory ideas about female discourse have consequently – and maybe unsurprisingly – been “attacked, misrepresented, qualified, refuted and constantly criticised...[although] no-one can say they have been uninfluential” (Holmes 1990, 185).

Among the many subsequent efforts to engage with Lakoff's theories, Janet Holmes (1990, 2008) has sought to take a more systematic approach, analysing corpora of women's spoken discourse to reach some remarkably different conclusions, notably with regard to women hedging. Whereas Lakoff saw hedging as a manifestation of the oppression of women, Holmes offers the contrasting perspective that, given the intrinsic value of hedging to facilitate discussion (Lakoff 1972, 1975, Halliday 1994, Prince/Frader/Bosk 1982, 1985, Salager-Meyer 2016, Hyland 1996, 1998, Skelton 1988), hedging may actually enable women to “assert their views with confidence” (1990, 202) in certain circumstances, by using the power of hedging to get their point across and maximise the likelihood of it being accepted, in a strategy analogous to the way hedging is employed in scientific discourse.

Holmes (1990, 185) is cautious to avoid the pitfall of binary evaluation of hedging as “all good” or “all bad,” highlighting the overriding importance of context in determining and evaluating the role – and interpretation – of hedging in discourse. Depending on such factors as the relative formality or informality of an exchange, the topic of discussion, demographic factors of the female speaker as well as gender, and other demographic aspects of the interlocutor(s) (1990, 194), hedging may be indicative of empowered or disempowered speech. The perspective of Lakoff (1973, 1975) is thus still valid and may now be complemented by Holmes' (1990, 2008) work to provide a more complete picture of hedging in female discourse, where it can be both a valuable communication strategy, or indeed, indicative of inequality and oppression.

Key to uncovering and interpreting the somewhat ambiguous role of hedging in female discourse is therefore context. In the case of this research article, the focus is on an examination of hedging in scientific

discourse and the role of hedging by women within this setting. This would suggest a positive disposition to hedging as a linguistic tool intrinsically valued within the Sciences. However, the significant underrepresentation of women in the fields of science (Blaisdell 1994, 167) calls for a more cautious interpretation of this context as one not necessarily conducive to women speaking with authority, but rather trying to assert themselves in an environment where they are in the numeric minority (Blaisdell 1994, 167), and therefore at a psychological disadvantage.

3 Methods

This research is corpus-based and produced within the framework of CDA, in that it approaches discourse as social practice (Fairclough 1992, 63) performed within sociocultural, economic, political, and ideological contexts, that both shape – and are shaped by – it (1992, 66). It is not concerned with examining “linguistic competence” (Chomsky 1965, 19), but rather what linguistic *performance* reveals about persistent inequalities in society, individuals, and the social structures they inhabit (Baxter 2010, 244).

Given the gender dimension inherent to the research questions, it is necessary to locate this study in the somewhat contentious space of gender orientation and identity. Here, thinking was guided by the influential work of Judith Butler (1999) to grapple with “the meanings...[and] indeterminacy of gender” (1999, vii), with gender explored as *social identity* – as opposed to biological category. In common language, gender is generally associated with normative ideas about the social, psychological, and behavioural characteristics of being a woman or a man, whereas sex in a similar context would tend to refer to the biological classification of having female or male reproductive organs (Pryzgodna and Chrisler 2000, 554). This reflects how ‘gender’ is used in common discourse, however “[taken] to its logical limit, the sex/gender distinction suggests a radical discontinuity between sexed bodies and culturally constructed genders...[whereby] it does not follow that the construction of ‘men’ will accrue exclusively to the bodies of males or that ‘women’ will interpret only female bodies” (Butler 1999, 6). But this radical theorisation of gender does not reflect in the common sense understanding of the word and associated stereotypes, where the conception of gender as a fixed binary is still predominant (Lazar 2018, 373). It is this dominant social construct of gender as essentially binary that also shapes notions of what it means to “[talk] like a lady” (Lakoff 1973, 43). Following Lakoff (1973), the focus of this study is thus on “women’s speech [as opposed] to men’s speech” (Lakoff 1973, 49), acknowledging that this is just one perspective on the complex matter of gender as it is performed in language.

The primary corpus analysed comprises 1,720,040 tokens and is composed of publicly available transcripts of public meetings held by the Presidential Commission for the Study of Bioethical Issues (Bioethics Commission), active from 2009 to 2017 in the United States of America. This source was selected as it captures public discourse of women and men who are scientific experts, thereby meeting the research objective to investigate the role of gender in hedging practices within scientific discourse. The decision was taken to focus on utterances of commission members only, as they account for 38% of tokens and sufficient biographical data are available for them, for their scientific credentials to be classified and gender tags assigned, in line with research objectives. Utterances by invited guest speakers and members of the audience (press and interested members of the public) were thus excluded from the research scope. This reduced the Bioethics Commission data set to 639,224 lexical tokens, spoken by 12 Commission members, of whom 5 could be tagged as women (she/her) and 7, as men (he/him), producing a data subset of 414,517 tokens spoken by the Commission members who identify as women and 224,707 tokens, by members identifying as men.

The over 1-billion word “Corpus of Contemporary American English” (Davies 2017), which is available online, was used as a benchmark corpus, as it is a purpose-built representative corpus of common discourse in the United States of America. Given the discrepancy in sample sizes, all data were normalised ($n = 1,000$) for comparison, and as both dependent and independent variables analysed are categorical, the statistical Chi-square (χ^2) test was applied (Levon 2018, 144–8).

For preparation of the Bioethics Commission corpus, all transcripts were downloaded from the source (<https://bioethicsarchive.georgetown.edu/pcsbi/node/851.html>), converted from portable document format (PDF) to machine-readable text files, compiled as a database and parsed using the programming language AWK (named for the original developers Aho, Weinberger, and Kernighan) to extract the utterances of each individual commission member. To note, the AWK code (attached – see Appendix 2) needed extensive refinement to ensure that all relevant utterances were captured – for perspective, the initial code attributed only 2% of the total corpus as coming from commission members but increased to 38% after revision to account for inconsistent naming conventions between transcripts, as well as spelling errors and typos. This produced a database that can be sliced for analysis at five levels, namely: (i) total corpus (1,720,040 tokens), (ii) commission members-only (639,224 tokens), (iii) commission members identifying as women (414,517 tokens), (iv) commission members identifying as men (224,707 tokens), and, of course, (v) commission member-specific utterances.

A limitation that needed to be grappled with in transforming the meeting transcripts to a corpus for CDA was that they had been generated for the purpose of documentation and record keeping, and therefore omit much of the interpersonal and situational details that could meaningfully inform CDA research (McEnery and Hardie 2012, 4). However, the practical advantage of easily accessing such an extensive repository of discourse by scientific experts was judged to outweigh the limitation of leveraging a corpus not purpose-built for linguistic analysis.

Another dilemma confronted was how to deal with contractions, for example “I’d” as opposed to “I would.” Here, the decision was to leverage Python to extract all possible contractions which were manually sorted to identify relevant cases and Python used to replace these with the corresponding formulation written out in full, such that in the given example, “I’d” became “I would.”

Once the data had thus been cleaned (removal of special characters appearing in data transfer from PDF to Latin-1 text files) and prepared using Python, analysis was conducted using AntConc, version 3.5.9 (Macintosh OS X) 2020, and Python 3.9.6 and the Natural Language Processing Toolkit, to assess word frequencies, generate concordances – Key Word in Context (KWIC) – and examine collocations with the investigated auxiliary verbs.

4 Results and discussion

Overall, those members of the Bioethics Commission who identify as women appear to have dominated proceedings, accounting for 68% of all words spoken by commission members. This may be partially explained by the fact that the commission was chaired by a woman: Dr Amy Gutmann. Gutmann personally accounted for 40% of all words spoken by commission members, with much of what she said directed towards managing the meeting process, such as opening and closing sessions, welcoming, and thanking guest speakers, agenda updates, and procedural guidance. But even in a scenario where the words of Gutmann and – to be consistent – those of the vice-chair, Dr James Wagner, were excluded from the count, the other commission women still have a leading share of voice, at 63%. This is noteworthy, as excluding Gutman’s linguistic work to manage the meeting leaves only discourse focused on the matters at hand, such that the remaining women can be regarded as having been active participants in the “hard” scientific content of commission proceedings and not just “soft” organisational matters and interactional facilitation – what Fishman derisively terms the “conversational shitwork” (1978, cited in Lakoff 2003, 162) typically designated to women. This is also remarkable as it suggests that the women of the commission spoke often and fully (i.e., without interruption), which contrasts positively with past findings that men tend to linguistically dominate professional space, “typically [holding] the floor 80 per cent of the time” (Lakoff 2003, 162) with “violative interruption of women” (2003, 162) as a matter of course. Indeed, an ingoing expectation, following the arguments of Lakoff (1972, 1975, 2003), was that the women on the Bioethics Commission would (a) speak less (2003, 162), (b) be interrupted frequently (2003, 162), and that (c) their use of *women’s language* would disempower them further (1975, 41). This was a fair assumption, especially considering the

work of the commission in the wider context of chronic underrepresentation of women in Science, Technology, Engineering, and Mathematics (McNally 2020, 2) arguably stacking the socio-economic odds against them. However, with a chairwoman and an apparent emphasis on gender, racial, and age diversity in the commission composition overall, evidently a sufficiently inclusive environment had been achieved for women to feel enabled to fully participate, overturning assumptions (a) and (b). Critically assessing the veracity of assumption (c), namely the role of *women's language* – and the tendency to hedge (Lakoff 1975, 79–80) specifically – within this discourse, is the focus of the following exploratory study.

Before identifying and examining apparent gender-based differences in the discourse of the Bioethics Commission members, it is worthwhile to consider the broader context of their utterances as scientific discourse. Certainly, if the use of hedging is a marker of scientific discourse as researchers have demonstrated (Hyland 1996, 1998, Markkanen and Schröder 1989, 1992, cited in Markkanen and Schröder 2010, 5, Salager-Meyer 2011), then the utterances of the commission members appear to support the observation abundantly. As reflected in Table 1, modals were used with a frequency of 19.34 per thousand words in the discourse of commission members but occur with a frequency of only 11.33 per thousand words in the benchmark corpus, representing common discourse. Confirmed by Chi-square statistical significance testing ($\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$), this reflects statistically significant preference for expressing modality via modal auxiliary verbs in the commission discourse and, thereby, a *marked* preference for formulations that expand dialogic space (Martin and White 2005, 103) in a linguistic move consistent with the conventions of scientific discourse.

In terms of the specific modal auxiliary verbs used, the data presented in Table 2 – which were also subjected to Chi-square testing ($\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$) to ensure statistical significance – reflect that commission members employed all modals more frequently ($M = 1.94, SD = 1.57$) than the benchmark corpus, with the exception of “must” (index 33 vs benchmark) and “shall” (index 9).

The most frequently used modal was “would,” with a normalised frequency of 5.11 per thousand words among members of the Bioethics Commission, compared to just 2.30 per thousand words in the benchmark corpus. This marked difference is striking as “would” is arguably the quintessential modal to express the conditional mood, implying a possible outcome to a hypothetical situation. As a hedge, it takes whichever statement that follows it, clearly into the realm of possibility, although it also evokes a sense of thoughtful reasoning behind this prediction that is appropriately scholarly. One might argue that using “would” is unnecessarily vague and tentative (Cotton 2018, 273), translating apparent “facts” to abstract approximations. But it is precisely this subtle dance around the truth that exemplifies the leverage of hedging to intentionally open dialogic space in scientific discourse. Consider the logic that “A equals B, and B equals C, therefore A *would be* equal to C,” and the alternative clincher as a bald assertion that “A is equal to C.” The former implies deduction: the latter, an indisputable fact. As such, the former creates space to interrogate the underlying logic (as, incidentally, did Euclid), whereas the latter eschews such debate, contracting dialogic space and resisting the critical intellectual engagement conventionally embraced in scientific discourse to move knowledge forward.

The simple fact that “would” is the past tense form of “will” aside, both express modality, but to different degrees. As a modal auxiliary verb, “will” is a forward-looking prediction whereas “would” is more hypothetical. “Would” may be described as expanding dialogic space along slightly stronger lines

Table 1: Word list extract: frequency of all modal auxiliary verbs used per 1,000 words (normalised, $n = 1,000$) by commission members, compared to benchmark corpus

	Bioethics Commission	Benchmark (Corpus of Contemporary American English)	Diff.	Index
All modal auxiliaries	19.34	11.33	8.01	171

$\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$.

Note: All statistical significance testing in this study done with Chi-square test (χ^2). Table footnote indicates Degrees of Freedom (df), sample size (n), and calculated Chi-square value. In line with academic convention, significance is assumed as of $p \leq 0.05$. See Appendix 3 for Chi-square distribution values.

Table 2: Word list extract: frequency of individual modal auxiliary verb use per 1,000 words (normalised, $n = 1,000$) by commission members, compared to benchmark corpus

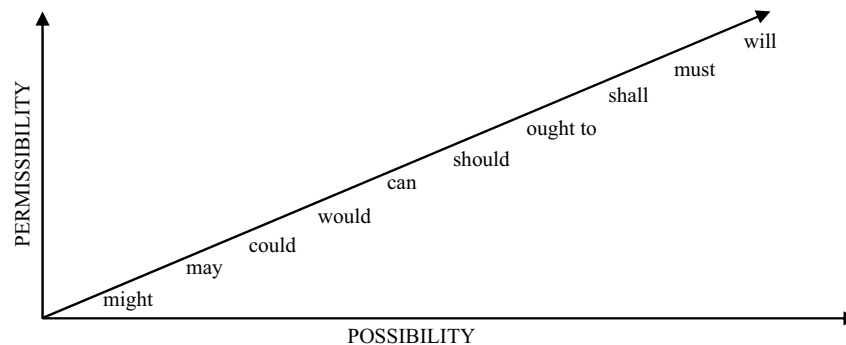
	Bioethics Commission	Benchmark (Corpus of Contemporary American English)	Diff.	Index
would	5.11	2.30	2.77	222
can	3.73	2.49	0.65	150
will	2.69	2.20	0.33	123
should	2.59	0.93	1.67	278
could	2.08	1.53	0.55	136
might	1.50	0.52	0.98	291
may	1.26	0.83	0.50	152
ought (to)	0.25	0.04	0.21	697
must	0.14	0.43	-0.28	33
shall	0.01	0.08	-0.08	9

$\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05.$

than “it’s probable that” (Martin and White 2005, 134), whereas “will” radically contracts dialogistic space by pronouncing (2005, 134) and thereby excluding alternative possibilities. As such, “will” is more forceful and therefore, within the “delicate facework” (Hyland 1998, 5) of scientific discourse, potentially more face-threatening. So, it is not surprising that, while commission members made frequent use of “will,” with a normalised frequency of 2.69 per thousand words, there was a much stronger preference – reflected in a normalised frequency of 5.11 per thousand words – for the more dialogically open – and less face-threatening – modal auxiliary “would.”

“Can” was the second most frequently used modal auxiliary in the commission data set. With a normalised frequency of 3.73 per thousand words, this use of “can” is significantly ($\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$) above the comparable frequency of 2.49 in the benchmark corpus, despite the fact that “can” is the modal with the highest frequency of occurrence in the benchmark corpus. The modal “can” emphatically expresses potential, possibility, and – frequently replacing “may” in contemporary discourse – also permission. To visualise the relative confidence encoded in this formulation, it may be helpful to consider “can” in relation to other modals on the proposed continuum or rather, cline (Figure 1) of possibility, as in “*is it intrinsically able to be true?*” and social sanction (Martin and White 2005, 52) or permissibility, as in “*is it extrinsically permitted to be true?*” – both variables that are important considerations in weighing the scientific acceptability of a claim.

In this illustrative visualisation, “can” appears at roughly the mid-point of what is possible and permissible. It may be useful to compare “can” and “could.” “Can” is definitely more emphatic than “could,” *pronouncing* (Martin and White 2005, 127–9) that something is possible, although whether one acts upon that possibility or not is left open. “Could” is more circumspect, expanding dialogistic space by only *entertaining* (2005, 104–1) the possibility of something being possible. Used respectively with a

**Figure 1:** Illustrative cline of modal possibility (X) and permissibility (Y).

statistically significant ($\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$) frequency of 3.73 and 2.08 per thousand words by commission members, and 2.49 and 1.53 per thousand words in the benchmark corpus, there is a marked preference for them among the commission members suggesting that the notions of empirical possibility they encode are particularly relevant to scientific discourse.

Another set of modal auxiliary verbs to compare are “might,” “may,” and “must.” An intriguing pattern emerges in their use by commission members when the frequency of use data is normalised and compared to the benchmark corpus representing common discourse. First, as summarised in Table 3, “might” and “may” occur respectively with a normalised frequency of 1.50 and 1.26 per thousand words in the commission data set, but only 0.52 and 0.83 per thousand words in the benchmark corpus. As confirmed by statistical testing ($\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$), this reflects a marked preference for these modal auxiliaries among commission members. As visualised in Figure 1, “might” expresses a relatively weak assessment of possibility and “may” an only slightly stronger evaluation. The preference for these two modal auxiliary verbs in the scientific discourse of the commission, compared to common use represented by the benchmark corpus, therefore suggests that they make particularly useful linguistic tools in the exploratory work of knowledge creation. But what is even more striking is the second finding, namely, that the modal “must” occurs with a frequency of only 0.14 per thousand words in the commission data set, but three times this rate in the benchmark corpus, with a normalised frequency of 0.43 per thousand words. Taken together, this suggests a marked preference for “might” and “may” in scientific discourse, and a marked avoidance of “must.”

This dynamic may be explained by the fact that, where “might” and “may” encode tentative assessments of probability relative to possible alternatives, “must” leapfrogs over alternatives to *insist* on a particular viewpoint. It is interesting to note that, by the very act of insisting, the use of “must” indirectly acknowledges the presence of alternative points of view. However, seeking to knowingly override these alternatives could be well construed as imposing an opinion and therefore a face-threatening linguistic move, incompatible with the hedging conventions of scientific discourse. The markedly low use of “must” by members of the Bioethics Commission would seem to bear this out by reflecting an apparent avoidance of this potentially alienating modal.

A final sub-set of modal auxiliaries to consider is “should,” “ought (to),” “shall,” and “must.” Again, “must” would express potentially face-threatening insistence, leading to its evident deselection by Commission members. On the cline of modality, “must” is closely followed by “shall.” This was the least popular modal, both in the commission data set where it appeared with a normalised frequency of only 0.01 per thousand words and in the benchmark, where it appeared with a higher, but nevertheless completely marginal, normalised frequency of 0.08 per thousand words. Reticence to use “shall” may be due to its relatively narrow application to future time reference and the fact that it is a relatively formal – and arguably old-fashioned – formulation. As an expression of modality however, it encodes a degree of personal insistence that shifts it closer to “must,” which – as already noted – is evidently an anathema in the context of scientific discourse. This could well explain its minimal use by Commission members, who would therefore have been challenged to find alternative ways to insist on certain facts and/or actions. This is where “should” and “ought” may come into play. “Should” and “ought to” were used with a normalised frequency of 2.59 and 0.25 per thousand words, respectively, by commission members, but only occur with a normalised frequency of 0.93 and 0.04 in the benchmark corpus. Whereas “should” was the fourth most frequently used modal in the Bioethics Commission data set and “ought to” admittedly marginal, both cases

Table 3: Word list extract: frequency of “might,” “may,” and “must” use per 1,000 words (normalised, $n = 1,000$) by commission members, compared to benchmark corpus

	Bioethics Commission	Benchmark (Corpus of Contemporary American English)	Diff.	Index
might	1.50	0.52	0.98	291
may	1.26	0.83	0.50	152
must	0.14	0.43	-0.28	33

$\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$.

Table 4: Word list extract: frequency of “should,” “ought (to),” “shall,” and “must” use per 1,000 words (normalised, $n = 1,000$) by commission members, compared to benchmark corpus

	Bioethics Commission	Benchmark (Corpus of Contemporary American English)	Diff.	Index
should	2.59	0.93	1.67	278
ought (to)	0.25	0.04	0.21	697
must	0.14	0.43	-0.28	33
shall	0.01	0.08	-0.08	9

$\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05.$

reflect a marked ($\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$) preference for use in scientific discourse. Both “should” and “ought” express deontic necessity in a way that suggests an interesting role in forcing home a point within the codes of scientific discourse, by claiming the correctness of a proposition, while being careful not to insist that it *shall or must* be so. As a linguistic device, it is a clever alternative to the more emphatic formulations of “must” and “shall” that are evidently favoured in common discourse, because “should” and “ought to” leave open a degree of wriggle room that is more appropriate to the respectful engagement with peers in the fields of science (Table 4).

Against this backdrop of how modal auxiliary verbs were observed to be used in the discourse of the Commission as a whole, we can now move a level deeper to consider their hedging with modal auxiliary verbs through the lens of gender. As an ingoing observation, an examination of the overall use of modal auxiliaries reflects a slight tendency by those members identifying as women, to use modal auxiliary verbs more often. The women of the commission used modal auxiliaries with a normalised frequency of 1.98 per thousand words, compared to 1.85 among the men. Although not a significant difference between the women and men, both rates still compare markedly ($\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$) to the normalised frequency of only 1.13 modal auxiliaries per thousand words found in the benchmark corpus of common discourse. In this sense, the data support the claim about propensity to hedge as a marker of scientific discourse but do not indicate that women hedge more than men in the context of scientific discourse. This does not necessarily dispute Lakoff’s assertion that women hedge more frequently than men in common discourse (1973), but rather that the conventions of scientific discourse provoke men to hedge more frequently than they otherwise would. It also leaves the question of whether the women on the commission hedged *differently* from the men, for which a closer examination of individual modal auxiliary choices is required (Table 5).

Shifting to consider specific choices then, “would” again emerges as the most numerically significant overall, topping the ranking of modal auxiliary frequency for both genders. But at a normalised frequency of 5.01 per thousand words among the women, and 5.30 among the men, there appears to be a slight but, according to Chi-square inferential statistics ($\chi^2(df = 9, n = 1,000) = 124, p \leq 0.05$), nevertheless statistically significant preference for “would” among the men. This is also reflected in a lower frequency of “might” among the women, at a frequency of only 1.31 per thousand words, vs 1.85 among the men; “may” at 1.17 vs 1.42, and “ought” at 0.23 vs 0.29. This is striking because these are all modal forms that, as argued earlier, encode a weaker degree of certainty. Rather, the women demonstrated a preference for “can,” with a normalised frequency of 4.00 per thousand words, compared to 3.23 for the men, and also a preference for “will” (2.95 per thousand words, compared to 2.23 among the men), “should” (2.89 vs 2.03), and “could” (2.13 vs 1.99). Although these differences may appear relatively small in the normalised data set, Chi-square testing ($\chi^2(df = 9, n = 1,000) = 124, p \leq 0.05$) of all raw counts confirmed the significance of these differences

Table 5: Word list extract: comparison of modal auxiliary occurrences as per cent of total tokens (normalised, $n = 1,000$) among commission women vs men

	Bioethics commission women	Bioethics commission men	Diff.	Index
Modal auxiliary verbs	1.98	1.85	0.14	107

Table 6: Word list extract: comparison of frequency individual modal auxiliary use as per cent of total tokens (normalised, $n = 1,000$) by commission women vs men

	Bioethics commission women	Bioethics commission men	Diff.	Index
would	5.01	5.30	-0.29	94
can	4.00	3.23	0.78	124
will	2.95	2.23	0.72	132
should	2.89	2.03	0.86	142
could	2.13	1.99	0.14	107
might	1.31	1.85	-0.54	71
may	1.17	1.42	-0.25	83
ought (to)	0.23	0.29	-0.07	77
must	0.14	0.15	-0.01	95
shall	0.01	0.00	0.01	217

$\chi^2(df = 9, n = 1,000) = 124, p \leq 0.05.$

and suggest interesting nuances in how the modal auxiliary verbs were being used by the women and men of the Bioethics Commission (Table 6).

To explore this further, it may be helpful to refer back to the cline of possibility and permissibility (Figure 1), collapse this into a continuum, and overlay the normalised frequency data from Table 1 to visualise the respective preferences (Figure 2). Here, we can see a relative preference among the men of the Commission for modals that encode less certainty, compared to the women who tend to over-index on those that are more forceful. This suggests a bias to stronger hedging by the men of the Commission, to weaken propositions and thereby strengthen the shielding potential in the “delicate facework” (Hyland 1998, 5) of scientific discourse. But what then of the women? Certainly, a preference for more forceful articulations would be at odds with a Lakoffian (1972, 1975, 2004) view of their hedging as an expression of oppression and marginalisation. Rather, it would seem to provide compelling empirical support for the counter argument that women might actually use hedges to “assert their views with confidence” (Holmes 1990, 202).

5 “Would”

As previously noted, “would” appeared as the modal most frequently used by Commission members, with an overall normalised frequency of 5.11 per thousand words. The men of the commission had a slight bias in

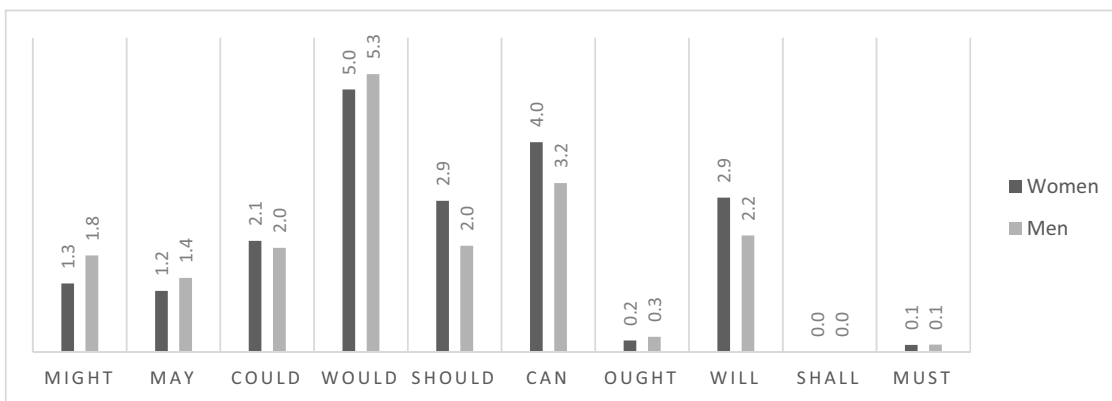


Figure 2: Modal auxiliary frequency of use (normalised, $n = 1,000$), arranged by increasing possibility/capacity and social sanction. $\chi^2(df = 9, n = 1,000) = 124, p \leq 0.05.$

favour of it, using “would” with a normalised frequency of 5.30 per thousand words, whereas it occurred with a normalised frequency of 5.01 among the commission women. It is necessary then to dig a bit deeper to search out the more subtle, and probably more revealing, differences in how the women used “would,” compared to the men. For this, an examination of collocations with the modal auxiliary verbs can be helpful.

The most frequent collocation (Table 7) with “would” in the data set was “be,” in such hypothetical projections as “would be able[...]” (28 cases), “would be possible” (2), and “would be more[...]” (9), and hypothetical judgements such as “would be ethical” (11 cases), “would be good/helpful/great” (31/29/17), “would be wrong” (7), or “would be a mistake/nightmare.” Women used “would be” with a normalised frequency of 1.334 per thousand words compared to 1.682, for the men – results that Chi-square testing confirms as significantly ($\chi^2(df = 46, n = 1,000) = 128, p \leq 0.05$) different. A much bigger delta is found in the use of “would not” and “would you” by the women, compared to the men, with the women of the commission using “would not” with a normalised frequency of 0.379 per thousand words, but the men only 0.218. In the case of “would you,” it appears with a normalised frequency of 0.265 per thousand words in the data set of women’s utterances, but only 0.156 for men. An extended discussion of “would not” will come later, but the formulation “would you” is also worthy of note as the position of an auxiliary preceding a (pronoun) subject cues an indirect or rhetorical question. This roundabout way of appealing to her interlocutor recalls two features associated with *women’s language*, namely a tendency to phrase statements as questions (Lakoff 1975, 78) and “[talk] like a lady” (1975, 43) by using “super polite forms” (1975, 80) that reinforce a submissive role in discourse. In fact, Lakoff specifically refers to women of “[her age] and general educational status” (1975, 78) who might eschew the more ridiculed markers of *women’s language* such as the use of excessive adjectives (1975, 78) but continue to overuse questions – a habit that she claims “dies [hard],” even among accomplished women as the case of the Bioethics Commission would appear to bear out. However, it would be too fast to conclude this without considering the positive role “would you...?” could be playing in this specific context of scientific discourse. As a hedged formulation, “would you” clearly expands the dialogic space (Martin and White 2005, 103) and appears to proactively shield the interlocutor by offering the possibility for dissent. A closer examination of the concordance of “would you” in the data set supports this as it functions to invite alignment (“would you agree”) and engagement (“would you consider,” “would you think,” “would you suggest,” “would you want,” and “would you like”). As such, the data seem to support a more positive interpretation of the use of this question formulation by the women of the commission to align with their audience, rather than as a symptom of uncertainty and submissiveness.

The second most frequent collocation with “would” in the data set is with the verb “like,” to express desire as in “would like.” This formulation hedges the expression of desire in a move that functions to effectively shield both the speaker and interlocutor from the possibility of the wish being rejected or otherwise not realised. As such, its use fits well with the goals of hedging in scientific discourse (Skelton 1988, 38). Although the women of the Commission tended to use the formulation “would like” slightly less frequently than the men, with a normalised frequency of 0.504 per thousand words compared to 0.538. Although Chi-square testing confirms the significance of this difference ($\chi^2(df = 46, n = 1,000) = 128, p \leq$

Table 7: Top five most frequent collocations with “would,” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
would	5.011	5.305	-0.294	94
would + be	1.334	1.682	-0.294	79
would + like	0.504	0.538	-0.034	94
would + not	0.379	0.218	0.161	174
would + you	0.265	0.156	0.110	170
would + have	0.191	0.196	-0.005	97

$\chi^2(df = 46, n = 1,000) = 128, p \leq 0.05.$

Table 8: Frequency of collocation of “would” with verbs of desire and aversion, as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
would	5.011	5.305	-0.294	94
would + want	0.080	0.076	0.004	105
would + (like/love)	0.601	0.565	0.036	106
would + like	0.504	0.538	-0.034	94
would + love	0.096	0.027	0.070	361
would + hate	0.012	0.004	0.008	271

$\chi^2(df = 46, n = 1,000) = 128, p \leq 0.05.$

0.05), a much clearer contrast exists in the case of “would love.” As reflected in Table 8, the women on the Bioethics Commission appear to love the enthusiastic formulation “would love,” using it with a normalised frequency of 0.096 per thousand words, but the men don't: “would love” appears with a normalised frequency of only 0.027 in their data set. Similarly, the women had a marked preference for the formulation “would hate.” Also tested to confirm significance ($\chi^2(df = 46, n = 1,000) = 128, p \leq 0.05$), the commission women used “would hate” almost three times as often, as the men. Lakoff might argue that such passionate emotional references as “love” and “hate” evoke “the social context of [the] utterance” (1975, 44) and point to the impacts of societal norms around appropriate language choices for women, as opposed to men, with emotions evidently more accepted as a domain for *her*, than *him*.

The women of the commission evidently used “would like/love” (index 106) *more* than the men, but *who* desires, and *what* exactly is desired? Table 9 addresses the latter, reflecting that, in most cases, it was the speaker her/himself who was doing the desiring, that is: “I would want/like/love[...].” Beyond this, the men evidenced a strong preference for the communal “we,” generalising the emotion to the group as in “we would want/like/love[...].” in a move that suggests further reticence to own the desire. In terms of the projected “you would want/like/love[...],” a third of these occurrences in data set are preceded by “if” and almost all relate to process comments such as “if you would like to come to a microphone,” “if you would like to start us off,” “if you would like to ask a question,” and so on. Again, the fact that the meetings were chaired by a woman skews the data with a preponderance of such expressions which, while not serving the express purposes of hedging in scientific discourse, nevertheless play a critical role in moving the meeting forward. One might quibble over the necessity to be quite so polite about it and whether this might again be symptomatic of the excessive politeness associated with “talking like a lady” (Lakoff 1975, 43), but taking into account that it was a formal setting, would likely offset such an assessment.

If it is mostly the speaker her/himself who would desire, *what* is it that she/he is desiring/requesting? An examination of the concordance of the numerically most significant formulation “I would like” suggests five main groupings of purpose: “hedge a question” and the related “hedge a request for information,” “hedge a suggestion,” “hedge some other intention,” and “process comments and gratitude,” as summarised with sample text in Table 10.

Table 9: Collocation of “would” with pronouns (i/we/you) and verbs of desire, as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
would	5.011	5.305	-0.294	94
I would + want/like/love	0.434	0.454	-0.020	96
we would + want/like/love	0.053	0.089	-0.036	60
you would + want/like/love	0.060	0.049	0.011	123

$\chi^2(df = 46, n = 1,000) = 128, p \leq 0.05.$

Table 10: “I Would like” concordances, grouped and counted by type, with frequency as per cent of total tokens (normalised $n = 1,000$)

Type	Samples	Frequency
Hedge question	I <i>would like</i> to segue that into a question[...] I <i>would like</i> to ask you: Among the readings[...] So the question I <i>would like</i> to ask you is[...]	0.030
Hedge a request for more information	I <i>would like</i> to hear a little bit more[...] I <i>would like</i> each of you to give examples[...] I <i>would like</i> to probe you a little further[...]	0.075
Hedge a suggestion	I <i>would like</i> to mention there are several ways[...] I <i>would like</i> to take your theme and suggest[...] I <i>would like</i> to suggest that[...]	0.056
Hedge other action	I <i>would like</i> to highlight the importance of[...] I <i>would like</i> to say a few words about[...] I <i>would like</i> to do two things[...]	0.081
Process comments and gratitude	I <i>would like</i> to welcome you to our 26th meeting[...] I <i>would like</i> to start by asking Christine to[...] I <i>would like</i> to thank everybody on the Commission[...]	0.102

When all “I would like” statements are grouped and coded, the role of the chairwoman, Dr Gutmann, emerges clearly in the numerous (normalised frequency of 0.102 per thousand words) process comments, politely hedged with the modal auxiliary “would.” When the utterances of Gutmann are excluded, as in the data normalised, significance tested ($\chi^2(df = 4, n = 1,000) = 54, p \leq 0.05$) and presented in Table 11, this leaves an interesting picture of how “would like” was used – predominantly by the commission men – to hedge questions (occurring with a frequency of 0.045 per 1,000 words), requests (0.151), suggestions (0.098), and actions (0.102) in discourse moves that exemplify the facework of hedging in scientific discourse. The women were significantly less likely to use “I would like” in these ways, with a normalised frequency of 0.022 per thousand words to hedge a question; 0.034 to hedge requests and suggestions, and 0.070 to hedge some other action. When one considers that the act of asking a question or requesting more information poses a risk to the face of the speaker, as it might imply a gap in the speaker’s knowledge and/or understanding, it would justify a hedge to offset this, as the men evidently were doing. Similarly asking a question or requesting more details may be potentially face threatening to the interlocutor as well, by suggesting that a point has not been sufficiently made and therefore requires follow-up. So too the inherently risky linguistic move of making a suggestion, which could be challenged and/or rejected, or unwelcome because it challenges the work and/or beliefs of the interlocutor. As such, these interactions would exemplify the need for the two-way “shielding” that hedging has been noted to provide in scientific discourse (Prince/Frader/Bosk 1982, 1985, cited in Markkanen and Schröder 2010, 5). It is noteworthy that it is the men of the Commission who seem to take most advantage of this linguistic tool, which could demonstrate greater mastery of the genre or a heightened sensibility to the need to protect face.

Table 11: Frequency of “I would like” concordance types, as a per cent of total tokens (normalised, $n = 1,000$)

Hedge[...]	Bioethics commission women	Bioethics commission men	Diff.	Index
[...]a question	0.022	0.045	-0.023	49
[...]a request for more information	0.034	0.151	-0.118	22
[...]a suggestion	0.034	0.098	-0.064	34
[...]other action	0.070	0.102	-0.032	68
Process comments and gratitude	0.145	0.022	0.122	651

$\chi^2(df = 4, n = 1,000) = 54, p \leq 0.05.$

Another area of striking contrast is the use of “would” by those commission members identifying as women, to hedge negation and disagreement. As captured in Table 12, the commission women employed “would not” and “would disagree” with a normalised frequency of 0.379 per 1,000 words and 0.010, respectively, compared to the men’s use of these verb phrases with a normalised frequency of 0.218 and 0.004, respectively. It is significant ($\chi^2(df = 46, n = 1,000) = 128, p \leq 0.05$) that the women of the commission were thus almost twice as likely to prefix “not” with the softening effect of “would,” and more than twice as likely to similarly soften the potentially more face-threatening act of disagreement. This apparent unwillingness to state a negative directly would be consistent with the conventions of hedging in scientific discourse, but the relatively heightened sensitivity of the commission women compared to the men again recalls the dilemma of extreme politeness (Lakoff 1975, 80) as indicative of social pressure that women “[talk] like a lady” (1975, 43), or whether it reflects skilful use of shields, in the sense of Prince/Frader/Bosk (1982, 1985, cited in Markkanen and Schröder 2010, 5). At this point, it may be helpful to heed the caution Holmes to not default to a binary interpretation of hedging (1990, 185) in *women’s language* (Lakoff 1973, 1975) – it may indeed, be a bit of both. That said, it is interesting to note that while the women are at pains to hedge disagreement and negation, their male peers appear more concerned with hedging their agreement. The commission men were three times as likely to hedge their agreement than the women, using “would agree” with a normalised frequency of 0.085 per 1,000 words, whereas women used this phrase with a frequency of only 0.029. Certainly, the agreement is a moment where shielding of the interlocutor is probably less necessary; however, the speaker may wish to shield his own face in potentially having to concede a point.

A final area considered in this exploratory study of “would” is the collocation with “just” – a word that serves to minimise what comes next in the sentence. This is a formulation that was strongly associated with the speech of the commission women who used it with a normalised frequency of 0.138 per 1,000 words, compared to only 0.40 by the men. The use of “just” encodes an apologetic and submissive tone, which would support a Lakoffian reading of this particular hedging collocation as an example of disempowered discourse (Table 13).

6 “Can”

The women of the Bioethics Commission used the modal auxiliary “can” with a normalised frequency of 4.005 per thousand words, compared to a frequency of 3.226 among the men.

These are, according to Chi-square testing ($\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05$), statistically significant findings and arguably, socially significant too, especially when the surrounding co-text is explored to discern the different ways that it was used by the women, compared to the men. The top five most frequently occurring collocations are summarised in Table 14 as “can be,” “can do,” “can’t be,” and “can I” and “can we.” Amongst these collocations, those used more frequently ($\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05$) by the commission women were “can be” (normalised frequency of 0.415 per thousand words, compared to 0.356 among the men), “can do” (0.222 vs 0.129), and “can I” (0.157 vs 0.098).

Table 12: Frequency of collocation of “would” with agreement and negation, as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
Would	5.011	5.305	-0.294	94
would + not	0.379	0.218	0.161	174
would + agree	0.029	0.085	-0.056	34
would + disagree	0.010	0.004	0.005	217

$\chi^2(df = 46, n = 1,000) = 128, p \leq 0.05$.

Table 13: Frequency of collocation of “would” with “just,” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Index
Would	5.011	5.305	94
would + just	0.138	0.040	343

$$\chi^2(df = 46, n = 1,000) = 128, p \leq 0.05.$$

Among these frequently used collocations is the binary pairing “can be” and “can’t/cannot be.” The former – “can be” – appeared with a normalised frequency of 0.415 per thousand words in the commission women data set. This is slightly ahead of the men, who used it with a normalised frequency of 0.356, but a more striking relationship exists in their use of “can’t be.” Whereas the women were more likely to declare what “can be” (0.415 per thousand words), they were much less likely to pronounce on what “can’t be” with a normalised frequency of just 0.101 occurrences per thousand words. This normalised frequency of 0.101 is statistically significant ($\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05$) compared to the frequency of 0.392 per thousand words by the men – reflecting an index of just 26. Recalling the cline of modals depicted early in Figure 1, “can” is approximately at the midpoint of the illustrative scale, as a modal ideally suited to hypothesise and theorise what can be possible. “Can” is dialogistically expansive, especially in its contemporary use which has expanded beyond the boundaries of what is physically able to be true, into the territory of “may” to also include an element of social sanction. This would make “can” an ideal hedge within the conventions of scientific discourse. However, “can’t” has a more definite impact, that relates more to the strict “dictionary meaning” of “can” as denoting what is physically able to be true, such that “can’t” – and “cannot” – become synonymous with “not possible.” This is a formulation that radically contracts dialogistic space. It is therefore a relatively bold construction that would be potentially face-threatening in discourse, potentially offending interlocutors by rejecting their views, or not even giving them a chance to voice them.

Following Lakoff (1973, 1975) that women are, according to western social norms, expected to use more polite formulations that cannot be construed as imposing their views, the use of “can’t/cannot” – while not taboo – could be red flagged. This could be compounded by the fact that the standards of scientific discourse would also seem to be chary of such bold moves, which is reflected in an overall significantly ($\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05$) less frequent use of “can’t/cannot” formulations, compared to more positive – and much less face-threatening – “can” statements among commission members. If the ratio of use of the disclaiming – in the sense of Martin and White (2005, 134) – “can’t/cannot” compared to the entertaining “can” is calculated, the ratio for the commission women is 1:40, but 1:8 for men. This reflects the slight bias of the women towards positive “can” formulations, and very starkly, their avoidance of “can’t/cannot” which can be seen as a consequence of the double effect of normative expectations of *women’s language*, and scientific discourse.

Another binary pair of collocations frequently appearing in the data set is “can do” and “can’t/cannot do.” As reflected in Table 15, the women showed strong preference ($\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05$) for both,

Table 14: Top five most frequent collocations with “can,” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
can	4.005	3.226	0.778	124
can + be	0.415	0.356	0.059	117
can + do	0.222	0.129	0.093	172
can’t/cannot + be	0.101	0.392	-0.291	26
can + I	0.157	0.098	0.059	160
can + we	0.116	0.142	-0.027	81

$$\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05.$$

Table 15: Most frequent collocations with “can” and “can’t,” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
Can	4.005	3.226	0.778	124
can + be	0.415	0.356	0.059	117
can + do	0.222	0.129	0.093	172
can't/cannot	0.772	0.423	0.349	183
can't/cannot + be	0.101	0.392	-0.291	26
can't/cannot + do	0.063	0.022	0.041	282

$\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05.$

using “can do” with a normalised frequency of 0.222 per thousand words and 0.063 for “can’t/cannot do,” whereas the men used the forms with a normalised frequency of only 0.129 and 0.022, respectively. Following the discussion of the women’s general avoidance of “can’t/cannot,” what is different about “can’t/cannot” when combined with “do” that makes it acceptable – even desirable for the commission women to have used it?

Looking at how these forms are being used – Table 16 for examples – it is evident that “can do” and “can’t/cannot do” are largely used variously to express an evaluation of what is possible, which is deductive. It is externalised reasoning, positioned thereby as a neutral product of facts about what is or isn’t possible to be done. This effectively narrows the dialogistic space to alternatively *proclaim* (“can do”) or *disclaim* (“can’t do”) but makes the critical assumption that the interlocutor is on board with the logic and reasoning. A subtle move to position the interlocutor that aligns speaker and listener in a way that sidesteps the risk of disagreement and, as such, a particularly smart move – used especially by the commission women – within the boundaries of scientific discourse.

Returning to the top five most frequent collocations with “can” summarised in Table 14, the disjunctive question formulations “can I,” “can we,” and “can you” appear as the fourth and fifth most frequent. As reflected in Table 17, “can I” was the most frequently used, with a normalised frequency of 0.157 per 1,000 words by the women, but only 0.098 among the men. Men showed a smaller but nevertheless, according to Chi-square testing ($\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05$), statistically significant preference for “can we” with a frequency of 0.142 per thousand words, compared to 0.116 among the women. This is notable because the pronoun “we” generalises beyond the speaker to take in the group, whereas “I” is, of course, personal.

Taking a closer look at the use of “can I” and “can we,” as per the randomised text samples in Table 17, “can we” was generally used in a way that is dialogistically expansive (Martin and White 2005, 104), opening space to consider and hypothesise about what might be possible. “Can I,” on the other hand, was exclusively used to ask permission in a move that may be interpreted as a genuflection to politeness. Speakers did not wait on an actual response but proceeded under the assumption of concurrence, making the request largely symbolic. This is relevant to note given that, in her seminal work on *women’s language* (1973, 1975), Lakoff

Table 16: “Can do” and “Can’t/Cannot do” concordance

Type	Samples
“Can do”	<p>“When you can manufacture organisms and potentially inject them into the environment - something, I should say, that has not yet been done by synthetic biology, but synthetic biology is looking forward to the day it <u>can do</u> that for some very good reasons[...].” (Dr Amy Gutmann)</p> <p>“But when you are dealing with intelligence of unconventional warfare and terrorist organisations, a lot of times you can’t get to the fidelity of imminence. But what you <u>can do</u> is evaluate the threat.” (Dr Alexander Garza)</p>
“Can’t do”	<p>“These are things we <u>can’t do</u> yet, but theoretically possible in light of emerging science.” (Dr Nita Farahany)</p> <p>“At the NIH, I don’t know about other agencies, any research that involves foreign countries, it has to be justified as to why you <u>cannot do</u> such research in this country and why you need to go outside this country.” (Dr Raju Kucherlapati)</p>

Table 17: “Can” collocations with pronouns in questions, as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
can	4.005	3.226	0.778	124
can + I	0.157	0.098	0.059	160
can + we	0.116	0.142	-0.027	81
can + you	0.113	0.111	0.002	102
can + I + just	0.072	0.031	0.041	232

$\chi^2(df = 95, n = 1000) = 325, p \leq 0.05.$

argues that women are socialised to be more polite than men (1973, 56), and “[leave] a decision open, not [impose] your mind, or views, or claims on anyone else” (1973, 50). In this case, women nominatively request permission in a submissive move that, according to the frequency data, was disproportionately associated with the discourse of the commission women, rather than that of the men (Table 18).

Referring back to Table 17, “can I” appeared with a normalised frequency of 0.157 per 1,000 words in the discourse of the Commission women. In 46% of these cases, “can I” was collocated with “just” – “can I just” appeared with a frequency of 0.072. The case of “can I just” is particularly significant because it serves to minimise the apparent request further, such as “*Can I just* add a *minor* thing?” (Dr Christine Grady). This compares starkly with results among the men, where “can I” had a frequency of 0.098 and “can I just” at 0.031 accounted for just 32% of the instances. These are statistically significant differences according to the Chi-square test ($\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05$) and appear to amplify Lakoff’s observation that women seem to be socialised to use these submissive formulations, while men seem liberated from this pressure to state their views more directly. Following Lakoff’s logic, this would lead to a situation where a woman speaking directly may be criticised as being too direct, or too pushy, but if she does comply with expectations, she may come across as less confident than her male colleagues who are free to speak their mind. When one reflects on the social significance of this, it recalls Lakoff’s summary of the situation as “a girl is damned if she does, damned if she doesn’t” (1975, 48).

7 “Will”

Overall, “will” is probably the least “hedgy” modal auxiliary. In the illustrative cline (Figure 1), I would therefore position it at the highest end of maximum deontic and epistemic strength as encoding committed

Table 18: Random sampling of “can I” and “can we” collocations for illustrative purposes

Can I	<p>“<u>Can I</u> give you two specific examples of what you are talking about?” (Dr Raju Kucherlapati)</p> <p>“<u>Can I</u> suggest a potential friendly amendment?” (Dr Nita Farahany)</p> <p>“<u>Can I</u> – just a comment – I guess it must be very institutionally different but in our place everybody would have to at least come forward for a review.” (Dr Barbara Atkinson)</p> <p>“<u>Can I</u> make a clarification?” (Dr Raju Kucherlapati)</p> <p>“<u>Can I</u> just ask you to be a little bit more refined?” (Dr Amy Gutmann)</p>
Can we	<p>“[...] <u>can we</u> put a measure about the level of confidence that these vaccines would be safe or how safe they would be in children?” (Dr Raju Kucherlapati)</p> <p>“How <u>can we</u> stimulate an ongoing ground level continuous discussion through seminars, through special sessions that would focus on detailed questions that might not reach the IRB level?” (Dr Stephen Hauser)</p> <p>“And I would want for us to be very careful about thinking about what <u>can we</u>, as a Commission, say that’s different and novel and useful at this level?” (Dr Nita Farahany)</p> <p>“To what degree <u>can we</u> really separate data use and data access?” (Dr James Wagner)</p> <p>“So we need to say, you know, what’s the sort of fruits of those endeavours and where <u>can we</u> go from building on that.” (Dr Christine Grady)</p>

and determined intent to a course of action and/or fully convinced prediction of a future event, as in: that *will* happen. “Will” can be said to *proclaim* (Martin and White 2005, 98) in a way that “rules out alternative positions” (2005, 98), contracting dialogistic space to a point that “will” does not fulfil the purpose of a hedge (Hyland, 1996, 434), and therefore will not be a focus for further exploration in this study.

That said, “will” did occur with great frequency in the data set, being used with a statistically significant ($\chi^2(df = 19, n = 1,000) = 48, p \leq 0.05$) normalised frequency of 2.948 per thousand words by the women and 2.225 by the men. An important note on the apparent significantly more frequent use of “will” by the women of the commission is that this finding was boosted by the process comments of the chairperson, Dr Amy Gutmann. Gutman accounts for 57 per cent of the instances of “will” with an investigation of concordance revealing much deontic use of “will” to guide proceedings, such as “Nita Farahany will be here in a few minutes,” “[...]just find a Commission member and they will be happy to help you,” “we will come back to it in our deliberations,” and “We will begin with our first speaker, Dr Ruth Schwartz.” As such, the frequency delta in the use of “will” between the women and men of the commission can also be discounted.

8 “Should”

The women of the commission demonstrated a statistically significant ($\chi^2(df = 11, n = 1,000) = 33, p \leq 0.05$) preference for “should,” using it with a normalised frequency of 2.888 per thousand words, compared to 2.029 among the men. “Should” encodes epistemic obligation and is a synonym for the more formal – and somewhat outmoded – modal auxiliary “ought.” It implies the rightness of something which serves to contract dialogistic space with the implication that alternative viewpoints would thereby go against the way things *should* be according to reasoning and/or social norms. It is an indirect, but relatively forceful, formulation that as a hedge would express a strong point of view, but – importantly – stops short of a mandate such as one might encode with “must.” The use of “should” would *proclaim* (Martin and White 2005, 134) an opinion but is still a hedge as it does not mandate. That the women of the commission used “should” more frequently than the men is therefore a notable show of confidence on their part. An examination of the most frequent – and statistically significant ($\chi^2(df = 11, n = 1,000) = 33, p \leq 0.05$) – collocations with “should” (Table 19) indicates that the most common in the Bioethics Commission is “should be.” This verb phrase is a hedged alternative to “is” – instead of saying that something *is* so, one says that it *should* be so, but not necessarily *is*. As such, a smart alternative to the kind of bare assertion that would clash with the conventions of scientific discourse. So too the phrase “should have,” which encodes a sense of regret that something did not happen – a potentially face-threatening move as it could be construed to imply an error on the part of someone. The women of the commission used “should have” with a normalised frequency of 0.092 per thousand words, compared to 0.080 for the men. Although the data are statistically significant according to Chi-square testing ($\chi^2(df = 11, n = 1,000) = 33, p \leq 0.05$), the increased use of the formulation by the women is not as starkly differentiated as with “should be,” but nevertheless serves to reinforce the

Table 19: Most frequent collocation with “should,” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
should	2.888	2.029	0.858	142
should + be	0.849	0.605	0.244	140
should + we	0.094	0.156	-0.062	60
should + have	0.092	0.080	0.012	114
should + not	0.080	0.085	-0.005	94
should + say	0.109	0.018	0.091	610

$\chi^2(df = 11, n = 1,000) = 33, p \leq 0.05$.

Table 20: Collocation of “should” with say, as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
should	2.888	2.029	0.858	142
should + say	0.109	0.018	0.091	610
I + should + say	0.053	0.009	0.044	596

$\chi^2(df = 11, n = 1,000) = 33, p \leq 0.05$.

impression that the women of the commission intelligently harnessed this particular modal auxiliary to hedge, and thereby soften, potentially problematic moves.

Another revealing area of the frequent use of “should” by the women of the Bioethics Commission is the collocation with “say,” and “I should say,” particularly. They used “should say” with a normalised frequency of 0.109 per thousand words, with “I should say” accounting for 49% of these instances at a normalised frequency of 0.053. This compares significantly ($\chi^2(df = 11, n = 1,000) = 33, p \leq 0.05$) with the men, who with a normalised frequency of 0.018 and 0.009, respectively, hardly ever used these phrases. Examining the phrase through the lens of Lakoff’s theory of *women’s language* (1973, 1975) should say expresses an obligation to speak that is inherently “hedgy,” as if the women of the commission feel the need to justify their right to speak. As such, this particular use of “should” is touched with a sense of unnecessary reticence that is, not least, revealed by the fact that men clearly did not feel the same obligation to use this formulation (Table 20).

9 “Could”

The modal auxiliary “could” was the fifth most frequently occurring in the Bioethics Commission data set, appearing with a normalised frequency of 2.078 per thousand words, compared to 1.527 in the benchmark corpus representing common discourse. These findings were statistically significant ($\chi^2(df = 9, n = 1,000) = 1,678, p \leq 0.05$), and suggest a marked preference for “could” in scientific discourse. In terms of the cline of modality (Figure 1), “could” suggests a higher degree of certainty than “might” or “may,” but encodes weaker deontic possibility than “can,” and is thus more dialogistically expansive. It is therefore an ideal hedge to explore options and unsurprising that it was used frequently by commission members, almost equally by women and men, who used it with a normalised frequency of 2.125 and 1.989 per thousand words, respectively. However, the way that “could” was put to use by the women of the commission diverged in statistically significant ways ($\chi^2(df = 19, n = 1,000) = 81, p \leq 0.05$) from the men. “Could be” was by far the most frequently occurring collocation, as reflected in Table 21, expressing a very hedged alternative to the bare assertion that would be expressed with the present tense of the verb “to be,” namely: “is.”

Table 21: Most frequent collocation with “could,” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
could	2.125	1.989	0.136	107
could + be	0.422	0.383	0.039	110
could + I	0.135	0.040	0.095	337
could + you	0.104	0.089	0.015	117
could + do	0.065	0.085	-0.019	77
could + have	0.099	0.080	0.019	123

$\chi^2(df = 19, n = 1,000) = 81, p \leq 0.05$.

Table 22: “Could” collocations with pronouns, as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
Could	2.125	1.989	0.136	107
could + I	0.135	0.040	0.095	337
could + you	0.104	0.089	0.015	117
could + we	0.048	0.049	-0.001	99

$\chi^2(df = 19, n = 1,000) = 81, p \leq 0.05$.

More striking though, is the appearance of collocations with the pronouns “I” and “you” as the second and third most frequently occurring collocations with “could.” This echoes the earlier discussion of “can I” and “can we,” as “could I” and “could you” are similar requests. Women used “could I” with a normalised frequency of 0.135 per thousand words, compared to only 0.040 among the men – a significant ($\chi^2(df = 19, n = 1,000) = 81, p \leq 0.05$) difference. This asks permission for the self in the same way as “can I,” which at a normalised frequency of 0.157 per thousand words in the discourse of the commission women, and 0.098 among the men, was also significantly ($\chi^2(df = 95, n = 1,000) = 325, p \leq 0.05$) associated with the speech of the women as a particularly submissive linguistic move. “Could you,” on the other hand, politely asks something of the interlocutor. It was also used more frequently by the commission women, with a normalised frequency of 0.104 per thousand words, as opposed to 0.089 among the men. Taken together, this bias among women to make more “could I” and “could you” suggests something of the apparent social pressure on women to be excessively polite and submissive that Lakoff posits in her work on *women's language* (1975) (Table 22).

However, if using polite requests is such a marker of the discourse of women, one would expect to see significant evidence of this in common discourse too. Although the benchmark corpus used does not allow for comparative analysis by gender, it was examined for at least direction perspective on this question. In Table 23, we see that the use of polite “could” requests is very low in common discourse. Commission members used “could I/you/we” with a normalised frequency of 0.105 per thousand words; 0.097, and 0.050 respectively, whereas these same requests appear with a frequency of only 0.015; 0.023, and 0.006 respectively, in the benchmark data. While we cannot see to the degree that this may be disproportionately driven by the utterances of men in the benchmark corpus, we can at least assume, based on the statistically significant differences ($\chi^2(df = 8, n = 1,000) = 808, p \leq 0.05$), that such “could” requests are more a marker of scientific – rather than common – discourse. This adds some dimension to the preceding comments that the “could” requests are a marker of the women of the commission submitting to gendered expectations around politeness. Rather, it suggests certain relevance of the construction, within the domain of scientific discourse. Although this does not diminish the fact that the women were using these polite requests more frequently than the men, it does serve to soften the evaluation as excessively submissive by the women, by suggesting that such moves to hedge statements and signal collegial respect may actually be more appropriate in the context of the Bioethics Commission work, as an example of scientific discourse.

In addition to examining hedges formed by collocations following the modal auxiliaries, preceding collocations were also considered. The most numerically significant ($\chi^2(df = 19, n = 1,000) = 81, p \leq 0.05$)

Table 23: “Could” collocations with pronouns, as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics Commission	Benchmark (Corpus of Contemporary American English)	Diff.	Index
could	2.078	1.527	0.551	136
could + I	0.105	0.015	0.090	685
could + you	0.097	0.023	0.074	415
could + we	0.050	0.006	0.044	857

$\chi^2(df = 8, n = 1,000) = 808, p \leq 0.05$.

Table 24: “Could” collocations with *preceding* pronouns, as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
could	2.125	1.989	0.136	107
we + could	0.432	0.458	-0.027	99
I + could	0.106	0.125	-0.018	85
you + could	0.364	0.280	0.084	117
one + could	0.007	0.120	-0.113	6

$\chi^2(df = 19, n = 1,000) = 81, p \leq 0.05$.

collocation was “we could,” occurring with a normalised frequency of 0.432 per thousand words in the discourse of the commission women and almost at a parity level in the discourse of the men, with a normalised frequency of 0.458. A potentially more interesting case is the pairing of “you could” and “one could.” Women showed a statistically significant ($\chi^2(df = 19, n = 1,000) = 81, p \leq 0.05$) tendency to use “you could” more frequently than the men, using it with a normalised frequency of 0.364 per thousand words, compared to 0.208 for the men. Reflecting a stark reversal, “one could” was almost exclusively used by the men of the commission, occurring with a normalised frequency of 0.120 per thousand words, compared to just 0.007 for the women (Table 24).

“One” is rather formal, an indefinite pronoun denoting the third person in a way that is abstracted and therefore arguably more hypothetical. “You” could be construed as addressing the audience directly, however, an examination of the concordance reflects almost consistent use of “you” as hypothetical, rather than literally addressing the audience. In most cases, such as examples A, B, and C, the use of “you” is interchangeable with “one.” I would argue that the preference for “you” over “one” in the discourse of the commission women is more indicative of the declining relevance of “one” in modern English, than anything else. So overall the hedging pattern of pronoun + “could” does not seem to reflect any significant difference between genders (Table 25).

A final area examined in the exploratory study of collocations with “could” in the Bioethics Commission corpus was the binary pairing of “could” and “could + not.” Women used “could” with a normalised frequency of 2.125 per thousand words and “could not,” with only 0.027. In the statistically significant ($\chi^2(df = 19, n = 1,000) = 81, p \leq 0.05$) comparison with the commission men data set, this reflects a preference for “could,” compared to the normalised frequency of use by men of 1.989, but a relative avoidance of “couldn’t/could not,” which men used with a frequency of 0.102. This reflects a similar dynamic to that seen for “can” and “can’t/cannot” (Table 14), where the men were almost four times more likely to say what “can’t/cannot” be, than the women. This pattern may suggest a reticence on the part of the commission women to express, even hedged, negative judgements, which may again be attributed to an abundance of politeness, and apparent heightened sensitivity to avoid face-threatening moves in the context of scientific discourse (Table 26).

Table 25: Concordance extract: “You could” in Commission Women Data set

Illustrative samples	
(A)	“But I think if you could make the National Academy of Medicine, for instance, be more openly deliberative or if <u>you could</u> put a commission that crosses administrations, would it make a difference” (Dr Barbara Atkinson)
(B)	“Is it right that if it was a dangerous gene sequence that <u>you could</u> simply buy the DNA synthesizer and sequence it in your own laboratory rather than purchasing the sequence from one of these companies?” (Dr Nita Farahany)
(C)	“Responsible Stewardship is really a unique principle – as far as we know – it’s unique to the human species to be able to engage in responsible stewardship in the sense that <u>you could</u> have instincts that enable you to maximize benefits and minimise risks and survival instincts.” (Dr Amy Gutmann)

Table 26: Frequency of “could” and “couldn't/could not,” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
could	2.125	1.989	0.136	107
couldn't/could not	0.027	0.102	-0.075	26

$\chi^2(df = 19, n = 1,000) = 81, p \leq 0.05.$

10 “Might”

As highlighted earlier (Table 5) in the statistically significant ($\chi^2(df = 9, n = 1,000) = 124, p \leq 0.05$) comparison of the use of modal auxiliary verbs by the women and men of the Bioethics Commission, the men showed a preference for “might,” using it with a normalised frequency of 1.847 per thousand words, whereas the women used it less frequently at a normalised frequency of 1.310 per thousand words. An investigation of the most frequent collocations with “might” does not reveal an statistically significant ($\chi^2(df = 13, n = 1,000) = 13, p \leq 0.05$) findings at the level of gender, according to Chi-square significance testing (Table 27).

11 “May”

As highlighted earlier (Table 5) in the statistically significant ($\chi^2(df = 9, n = 1,000) = 124, p \leq 0.05$) comparison of the use of modal auxiliary verbs by the women and men of the Bioethics Commission, the men showed a preference for “may,” using it with a normalised frequency of 1.415 per thousand words, whereas the women used it less frequently at a normalised frequency of 1.170 per thousand words. An investigation of the most frequent collocations with “may” does not reveal a statistically significant ($\chi^2(df = 13, n = 1,000) = 13, p \leq 0.05$) finding at the level of gender, according to Chi-square significance testing (Table 28).

Table 27: Most frequent collocation with “might,” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
might	1.310	1.847	-0.537	71
might + be	0.475	0.734	-0.259	65
might + have	0.077	0.107	-0.030	72
might + want	0.068	0.111	-0.044	61
might + not	0.053	0.067	-0.014	80
might + actually	0.019	0.036	-0.016	54

$\chi^2(df = 13, n = 1,000) = 13, p \leq 0.05.$

Table 28: Most frequent collocation with “may,” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
may	1.170	1.415	-0.245	83
may + be	0.379	0.552	-0.173	69
may + not	0.181	0.271	-0.091	67
may + have	0.084	0.098	-0.013	86
may + I	0.034	0.080	-0.056	42
may + want	0.041	0.053	-0.012	77

$\chi^2(df = 13, n = 1,000) = 11, p \leq 0.05.$

Table 29: Most frequent collocation with “ought (to),” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
ought (to)	0.227	0.294	-0.067	77
ought (to) + be	0.140	0.134	0.006	105

$\chi^2(df = 1, n = 1,000) = 1.226, p \leq 0.05$.

12 “Ought (to)”

As highlighted earlier (Table 2) in the comparison of the Bioethics Commission data set to a benchmark corpus (Corpus of Contemporary American English), the modal auxiliary “ought (to)” was used significantly ($\chi^2(df = 9, n = 1,000) = 1678, p \leq 0.05$) more frequently by commission members, at a normalised frequency of 0.250 per thousand words, than would be expected in common discourse, represented by the benchmark corpus with a frequency of 0.036. As such, it is a rather striking marker of the Bioethics Commission corpus which suggests the particular relevance of this rather formal and abstract hedge in the scientific discourse of the commission. Examining through the lens of gender reveals a slight bias towards using “ought to” among the men, with a normalised frequency of 0.294 per thousand words compared to 0.227 for the women, within the statistically significant ($\chi^2(df = 9, n = 1,000) = 124, p \leq 0.05$) overall review of modal auxiliary frequency in the discourse of the commission members (Table 5). However, further analysis of the frequency of collocations with “ought (to)” through the lens of gender does not generate any statistically significant ($\chi^2(df = 9, n = 1,000) = 1.226, p \leq 0.05$) findings, according to Chi-square significance testing (Table 29).

13 “Must”

Similar to the cases of “might,” “may,” and “ought (to),” analysis of collocations with “must” do not generate any statistically significant ($\chi^2(df = 1, n = 1,000) = 1.132, p \leq 0.05$) findings (Table 30).

14 “Shall”

The occurrence of “shall” in the corpus was limited to the point of being inconsequential, with only five instances (Table 31) appearing in the discourse of commission members, of which two reference a Bible verse, Matthew 20:16, saying “So the last shall be first, and the first, last: for many be called, but few are chosen.”

Table 30: Most frequent collocation with “must” as per cent of total tokens (normalised, $n = 1,000$)

	Bioethics commission women	Bioethics commission men	Diff.	Index
must	0.140	0.147	-0.007	95
must + be	0.072	0.049	0.023	148

$\chi^2(df = 1, n = 1,000) = 1.132, p \leq 0.05$.

Table 31: Concordance “Shall”

Women	And since in the Biblical form, the last The last Now, so Carlos,	shall be first[...] shall be first shall we be thinking about the possibility of[...] shall we begin with you?
Men	[...]so, you know, John Donne’s,	shall we then say that we are not those[...]

15 Conclusion

The high frequency of modal auxiliary verbs appearing in the discourse of the Presidential Commission for the Study of Bioethical Issues is consistent with earlier findings that hedging – and modal auxiliaries in particular – is a linguistic marker of scientific discourse (Hyland 1996, 1998, Markkanen and Schröder 1989, 1992, Salager-Meyer 2011). The commission members made abundant use of all modal auxiliaries, with the notable exception of “shall” and “must,” in marked contrast to common discourse. This serves to confirm modal auxiliary verbs as important lexical resources in the discourse of science.

Where this study stands apart from existing research into the phenomenon of hedging in scientific discourse, is that it considers the role of gender within this, bringing influential strands of research into epistemic modality in the scientific community of practice together with research into hedging as a marker of *women's language*. Whereas hedging is valued in the promulgation of scientific knowledge, its role in *women's language* is somewhat ambiguous whereby it can be positively appraised according to sexist norms as appropriately feminine or negatively construed as a lack of epistemic conviction and/or clarity. Despite these starkly contrasting evaluations of hedging in scientific discourse as opposed to women's language, hedging – and the use of modal auxiliary verbs in particular – is nevertheless considered a linguistic marker of both. This provoked the question of whether this might have a compounding effect such that women might therefore hedge *even more* than men in the context of a scientific discussion. It was therefore interesting to find that there was no significant difference in the analysed corpus of the propensity of those commission members who identify as women to hedge, in comparison to that of the men.

That both the women and men of the Bioethics Commission hedged with similar frequency, and significantly more frequently than one would in common discourse, would superficially suggest that their hedging was therefore primarily motivated and governed by the conventions of scientific discourse, however, a closer examination of the choice, frequency, collocation, and concordance of individual modal auxiliary verbs used, did reveal some significant differences. First, the men of the Bioethics Commission showed a preference for those modal auxiliary verbs (“would,” “might,” and “may”) that arguably function as stronger hedges, encoding less certainty than those used more frequently by the women, namely “should,” “can,” and “will.” Second, whereas hedges were primarily used by both the commission women and men as approximators in moves that exemplify the role of hedging in scientific discourse, where hedges were used as shields, the women tended to shield their interlocutor only, whereas the men more frequently deployed hedges to protect *their own* face and shield their professional credibility. This difference does suggest an imbalance between the commission members with the women subject to heightened sensitivity to the need to shield their interlocutor in line with gendered notions that women should be particularly careful to not impose their points of view (Lakoff 2004, 50). Intriguingly, this reticence seemed to be offset by the use of more forceful approximators by the women of the commission, with a preference for modals encoding strong conviction through the implied rightness of something – a smart linguistic way of avoiding stating something as a personal view, which would contravene both the conventions of scientific discourse and “talking like a lady” (Lakoff 1975, 43). The women also showed a marked preference for talking emphatically about what *is* possible, rather than not, and where they needed to disagree or negate something, would soften this with hedges to avoid causing any offence to their interlocutor, whereas the men were more concerned with hedging their agreements and thus protecting their own face. These patterns and differences in the hedging of the women and men of the Bioethics Commission suggest skilful linguistic navigation by the women of the dual expectations of them as participants in scientific discourse, as well as the social expectations of them as women.

Overall, the study thus presents an encouraging, albeit nuanced, picture of women communicating within the field of science and gives support to the argument advanced by Holmes (1990, 2008) that hedging in women's language should not be automatically interpreted as indicative of inequality and oppression, but rather considered more holistically for the value it can bring to “[oiling] the phatic wheels” (Hyland 1996, 433) of discourse. With a view to future research, given the particular value of hedging in scientific discourse, instances of women hedging in such a context should not be simply dismissed as adhering to oppressive conventions of gender performance, but rather more closely examined to evaluate

the potentially constructive role that hedging can play in expanding dialogic space, engaging interlocutors, and moving procedural process along, to the benefit of scientific knowledge creation for all.

Lakoff was emphatic in offering her theory of “Language and Woman’s Place” (1973, 1975) “less as a final word of the subject of sexism in language – anything but that! – than as a goad to further research” (1975, 40). The significant volume of subsequent research that her work has provoked is both testimony to the provocative strength of her thesis and the importance of the ideas that she advanced. This is no less true for the case of interrogating *women’s language* in the fields of science, where women remain starkly under-represented. Lakoff posited ten markers of women’s language with the potential to damn a woman if she complied with them, or damn her if she didn’t (2004, 48), but only one dimension – hedging – has been explored in this study, and only with regard to the use of modal auxiliary verbs. As such, this research study too is hopefully a goad to further research to understand how socially reductive and restrictive notions of how a lady *should* talk (Lakoff 2004, 43) may contribute to the struggles of women to achieve equality in the fields of science.

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