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Epistemic Modality in English Popular Scientific Texts and Their German Translations

Abstract

The present study investigates the use of epistemic modal markers in English popular scientific texts and their German translations, on the basis of a 500,000 word corpus of texts from 1978-2002. The results show that when a not strictly equivalent modal element is chosen by the translator, one tends to find expressions in the German translations that refer to a greater certainty than the modal in the English source. These translation choices can be related to the differences in genre conventions between English and German popular scientific writing. In the English texts epistemic modals are used to make the statements more indirect and thus less potentially face-threatening, leaving the addressee more room for disagreement. The German genre conventions, on the other hand, are characterized by a preference for strong claims and direct assertions. The fact that translators apply a 'cultural filter' (cf. House 1997) in this domain, while other studies (e.g. Baumgarten 2007) have shown that German popular scientific texts translated from English are prone to source-language interference, can be related to the pronounced differences between English and German that exist in the field of modal expressions.

1 Introduction

The present paper investigates differences in communicative conventions between English and German regarding the marking of epistemic modality. The communicative norms of English and German texts show significant differences in general (cf. e.g. House 1997) and also in the specific genre that this paper aims to discuss, i.e. popular scientific writing. Epistemic modality marks the degree of certainty with which the speaker/writer makes a claim about the truth of a proposition. On the basis of typical communicative preferences, of which an overview is given in table 1, markers of epistemic modality can be assumed to be used differently in English popular science texts than in the German texts.

As epistemic modal expressions can make a text more vague and can also be used to involve the addressee more strongly, one may expect to find them more commonly in English than in German texts. The purpose of this investigation is to find out how this difference in communicative preferences is handled in translations, and whether an influence of the global lingua franca English on German communicative preferences is perceivable in this regard.

English	German
Indirectness	Directness
Orientation towards persons/towards the addressee	Orientation towards content
Implicitness	Explicitness
Verbal routines	Ad-hoc formulation
more interactional	more transactional
more involved	more detached

Table 1: Communicative preferences in English and German texts (cf. House 1996)

The project on 'Covert Translation', from which this study originates, is based on the hypothesis that English as a global lingua franca has an impact on textual norms in other languages through language contact in multilingual text production. Covert translation functions as an interface between English and German. A covert translation is defined as a translation which aims not so much at complete faithfulness to the form of the original, but rather at functional equivalence. To achieve this, a cultural filter is applied which takes into account "the differences in communicative preferences, mentalities, and values" and adapts the text accordingly (House 1997: 79). However, because of the prestige status of the English language, we assume that the cultural filter is applied less consistently, leading to convergence of communicative norms in the genres where English is particularly dominant, such as popular scientific writing.

In the domain of epistemic modal marking we would thus expect to find that such markers are less frequently used in the earlier German translations in order to make the texts correspond more to German textual norms, while the later translations, on the other hand, should show an increase in the use of epistemic modal marking, making the German covert translations converge more towards the English communicative preferences.

Our popular science corpus allows us to test this hypothesis. The popular science corpus contains 500,000 words, consisting of English originals, their German covert translations and German comparable texts (i.e. monolingually produced texts from the same genre). It contains texts from two periods: the first one covering the years 1978-1982, the second one containing texts from 1999-2002. The present study presents first results, based on an analysis of all occurrences of the four modals *may*, *might*, *can* and *must* in epistemic use and their rendition in the translations. The aim is to gain insights into the types of translations of propositions containing these markers and the effect of the different translation choices on the overall communicative make-up of the

text. More detailed investigations into the use of epistemic modal markers in English and German are currently being carried out within the 'Covert Translation' project.

2 Epistemic Modality: Basic Definitions and Communicative Functions

One way to understand epistemic modality is as a special type of propositional modality. The distinction between propositional and event modality is made by Palmer (2001: 7-10). Under event modality, deontic (as in ex. 1) and dynamic modality (as in ex. 2) can be subsumed, while propositional modality covers epistemic (as in exs 3 and 4) as well as evidential modality:¹

- (1) Paul must dance now!
- (2) Paul can dance.
- (3) Paul may be dancing.
- (4) Paul must be dancing. (Disco music is coming out of his window, loud stomping noises are heard as well.)
- (5) Paul is dancing.

Basically, deontic modality refers to expressions of obligation (1) and dynamic modality to expressions of volition and ability (2). In both cases, the use of the modal marker refers to a different situation in the outside world: *Paul can dance* refers to a different event than (5) *Paul is dancing*. While *Paul can dance* refers to a stative situation, a state Paul is characterised by, a state of possessing the ability to dance, *Paul is dancing* refers to an activity ongoing at topic time (*Paul dances*, in the simple form, would refer to habitual, repeated activity). *Paul must dance now* is similar to *Paul can dance*, in that the use of the modal *must* alters the kind of event referred to by the predicate: in (1), this is a situation in which Paul is under the obligation to dance, i.e. once more we are looking at a different proposition. Thus, the use of 'event modal markers' changes the type of event the speaker refers to.

Examples (3) and (4) are different. In fact, they are closer to (5): (3), (4) and (5) could be used by different speakers talking about the exact same event in the outside world. Only, the speaker in (5) is sure about the claim made in his proposition, while the speakers in (3) and (4) are not. The speaker uttering (3) marks his proposition as

¹ Evidential modality will not be treated separately in this study, so that evidential uses of *must*, as exemplified in (4), will be included under the category of epistemic uses. This seems permissible as evidential and epistemic modality have important characteristics in common, as should become clear from the following. Furthermore, the evidential use of modals in English is always also epistemic, in that the speaker does not express absolute certainty as to the truth of the proposition, but only that, on the grounds of certain evidence, the proposition has a certain likelihood of being true. The use of evidential markers which provide information as to the source of the evidence but do not also cast a shade of doubt on the truth of the proposition is probably rather evidenced in languages where evidential modality is a more clearly grammaticalized category than in English, and where evidential markers also convey for example that the proposition refers to something personally witnessed by the speaker (cf. Palmer 2001: 35-52).

only possibly being true. The speaker uttering (4) marks it as being very probably true and, furthermore, as being based on some sort of logical deduction. The use of epistemic expressions thus alters the degree of commitment the speaker expresses as to the truth of the proposition.

Halliday in his systemic-functional framework distinguishes thus between *modality* (propositional modality, epistemic/evidential modality) and *modulation* (event modality, deontic and dynamic modality). While the latter changes the ideational meaning of a proposition, the former is part of the interpersonal function of language (Halliday 1976: 197f.).² The interpersonal function can be defined as “the use of language to encode interaction, allowing us to engage with others, to take on roles and to express and understand evaluations and feelings” (Hyland 2005: 26). It is in particular this use of modal markers that interests us here because one of the elementary hypotheses of the ‘Covert Translation’ project is that certain German genres, e.g. popular scientific writing, become more strongly interpersonal through the impact of the English model present in translation.

Broadly speaking, epistemic modal markers can be said to function as “speaker’s comment on the status of information in a proposition. They can mark certainty (or doubt), actuality, precision, or limitation [...]” (Biber et al. 1999: 972). We can see that through the use of epistemic modals (as in 3 and 4) speakers can “express [...] their lack of confidence in the propositions expressed in these utterances” (Coates 1995: 59).³

These remarks can serve as a starting point for the present investigation, but the question why speakers/writers choose to express a lack of certainty as to the status of propositions also needs to be addressed. Such expressions can serve different communicative purposes, not all of them captured by the idea that the truth of the proposition is truly doubted.⁴ For instance, I may state in an academic article *This may*

² A more elaborated and complex system is presented in Halliday (2004), but for the present purpose, his older system is sufficient and is preferred because it can be more easily related to the more traditional labels.

³ See also Diewald (1999: 13f.), who states that the function of deontic and dynamic modal expressions (non-epistemic modality in her terminology) is to characterize the subject of the sentence, while the function of epistemic expressions (epistemic modality) is to represent the speaker-based evaluation of the facticity of the proposition.

⁴ Although White (2003: 280) has stressed that “in the use of so-called epistemic modals and related resources [...] [w]e no longer see truth-value as the primary motivation”, one should also be aware of the fact that certain uses are surely best understood as straightforward expressions of uncertainty concerning the truth value of the proposition, while other uses truly have nothing to do with uncertainty (cf. also Graefen 2007). The two motivations for using an epistemic modal marker – real uncertainty concerning the validity of a proposition on the one hand, the wish to avoid potentially face-threatening communicative activity on the other – are, however, highly difficult to keep apart from one another in a corpus study. In individual instances, depending on the nature of the context, they may even be completely impossible to distinguish without actually asking the author why s/he chose to use such a linguistic device. The approach to this problem taken here is that, since epistemic modal markers undoubtedly can be used as hedging devices and as means of making a text more dialogic (in White’s 2003, White/Sano’s 2006 sense of the term), we shall assume that a higher frequency of these markers will bear a relation to the dialogic nature and to the interpersonal quality of a text.

*be the solution to the problems presented in the previous section, even if I am personally absolutely convinced that it is in fact the solution to these problems.*⁵

Epistemic modal markers can thus be used as hedges in order to build a more balanced author-reader relationship, in which the author does not tell the reader what to believe, but rather offers some ideas that s/he hopes to convince the reader of. This would appear to be more typical of English (popular) scientific texts than of German texts in this genre: in German, the conventions of scientific writing are such that information is presented as 'objectively' as possible, i.e. with a concentration, in Halliday's sense, on the ideational domain. Authorial stance is rarely expressed, the writer remains effaced from the text (cf. Drescher 2003). In English scientific writing, on the other hand, a common use of linguistic means of making the 'author-in-the-text' become visible can be observed (cf. House 1996, 1997; Baumgarten 2007).⁶

The use of an epistemic modal expression as a hedging device can be said to be motivated by a wish to be more polite, state matters less directly and leave more room for non-face-threatening intervention (such as disagreement) on the part of the addressee. Hyland (1998: 351) notes that "deference, humility, and respect for colleagues' views" are conveyed through the hedging use of epistemic modal markers. White and Sano (2006) stress that the use of such devices produces a more 'dialogic' text which allows for alternative positions and voices. They explain that hedging devices, such as epistemic modal markers

signal a recognition that, in the current communicative context, these are contentious matters and thereby [...] signal recognition that those being addressed may query, reject or at least find such propositions novel or otherwise problematic. By this mechanism, the interpersonal cost to any who might advance alternative views is lowered as their position is recognised as a valid one in the current ongoing colloquy. (White/Sano 2006: 194)

Thus we come back to the communicative preferences summarized above: the hedging use of an epistemic modal makes the text more interpersonal, more addressee-oriented, more indirect, and should therefore be more typical of Anglophone than of German texts. Another concept that shall prove useful in this study is the concept of facticity values, which has been introduced by Diewald (1999). Facticity values are

⁵ Graefen (2007: 7), discussing the use of hedges in academic writing, notes this, too, and states: "Diejenigen Autoren, die auf die Situierung ihres wissenschaftlichen Beitrags im fachlichen Diskurs achten, sind sich häufig der Zumutung bewußt, die neues Wissen bedeuten kann. "Hedging" ist dann tatsächlich eine sprachliche Vorsichtsmaßnahme, die den Gegensatz zu dem vorhandenen Wissen abschwächt." ('Those authors, who consider the way their academic findings get situated within the discourse of the discipline, often are aware of the imposition that new knowledge may represent. 'Hedging' is then indeed a linguistic measure of precaution, which softens the contrast to prior existent knowledge.')

⁶ Hyland (1998) notes that there are considerable differences between academic disciplines. Broadly speaking, the 'soft disciplines' emerge from his study as showing a more pronounced use of hedges and boosters than the 'hard disciplines'. Our corpus contains mainly texts dealing with natural scientific topics; however, as the texts are all *popular* scientific texts, they can be assumed to side rather with the 'soft disciplines' in Hyland's study. They have in common with Hyland's 'soft discipline' texts that they also heavily rely on "personal projection" (Hyland 1998: 372), as has been shown in several other studies based on our popular science corpus (cf. e.g. Baumgarten 2007, 2008; House forthc.).

defined by Diewald (1999: 174) as expressing the speaker's evaluation of the proposition with regard to its degree of reality and actuality. Concerning the use of epistemic modals as hedging devices, we can assume that those containing lower facticity values are more effective hedges, as they can be assumed to make the cost to someone wishing to advance an alternative even lower (compare e.g. *This may be due to...* to *This must be due to...*).

Based on the contrastive analysis of English and German general textual as well as specific genre conventions summarized above, we can assume that modals marking low degrees of facticity are preferred in English as opposed to German popular scientific texts, since they render a proposition more vague and less potentially threatening than markers of higher facticity.

Thus, we can state three hypotheses:

- 1 English discourse conventions are more likely to produce a frequent use of epistemic modal markers than German discourse conventions.
- 2 English discourse conventions are more likely to produce a frequent use of modal markers with low facticity values.
- 3 Due to the dominant role of English as a lingua franca, German covert translations and (to a lesser extent) independently produced German texts show a gradual convergence towards the Anglophone conventions.

3 The Use of Epistemic Modality in the Popular Science Corpus

In order to test these hypotheses, we shall conduct a pilot study on a selection of four core modals and the German expressions chosen to render them in the translations: *must*, which represents a very high facticity value, and *can*, *may* and *might* which mark mere possibility, i.e. a low facticity value. All epistemic uses of these four modals have been extracted from the corpus and the translations into German have been analyzed, firstly concerning the facticity value of the proposition in German (3.1), secondly concerning the formal ways in which modality is expressed in the translation (e.g. by a modal verb, or by a modal adverb, modal particle etc.) (3.2).

3.1 Facticity Values in English Source Texts and German Translations

As one can clearly see in the examples below, the German translations of epistemic modals present in the English source texts show some variation concerning the facticity values they convey:

(6) E: Such a resonance *may* account for Neptune's discontinuous ring.

G: Solch eine Resonanz *könnte* für die unregelmäßigen Ringe Neptuns verantwortlich sein. ('Such a resonance *may* be responsible for Neptune's irregular rings.')

(7) E: Some of the environmental influences *must* be more subtle than those identified so far.

G: Wir *dürfen* auch *nicht ausschließen*, dass irgendwelche subtilen Einflüsse noch übersehen oder unterschätzt wurden. ('We *should not exclude the possibility* that some subtle influences have been overlooked or underestimated.')

(8) E: Developing anti-hepatitis C therapies *may* be about to get easier.

G: *Wahrscheinlich* wird es den Forschern bald leichter gemacht, solche Therapien für Hepatitis C zu entwickeln. ('*Probably* it will be made easier for scientists soon to develop such therapies for hepatitis C.')

(9) E: Watching violent videos or playing shoot-'em-up computer games *may* push some children over the edge and leave others unaffected .

G: Nur ein Teil der Kinder gerät durch gewalttätige Videos oder grausame Computerspiele auf die schiefe Bahn; andere lassen sich von so etwas nicht aus dem Gleichgewicht bringen. ('Only some of the children get [indicative] off the right path through violent videos and brutal computer games; others are not thrown out of balance by such things.')

(10) E: [...] produce saxitoxins, the same toxins that *can* cause sometimes fatal poisoning in people who eat contaminated shellfish .

G: Saxitoxine *sind als* Verursacher von Muschelvergiftungen *berüchtigt*, die nicht selten tödlich ausgehen ('Saxitoxins *are infamous for* causing shellfish poisonings, which not rarely end fatally.').

Although the four English modals studied here are most often translated with an expression with the same facticity value (ex. 6), sometimes (though rarely) a modal expression of a lower facticity value is chosen (ex. 7), while, more frequently, a modal marker expressing a higher facticity value occurs in the translated text (ex. 8). What is even more remarkable is that not infrequently a modally unmarked proposition translates a proposition modified by *might*, *may*, *can* or *must* in the English original (ex. 9), thus expressing full facticity. In a few cases, translators have chosen creative ways so far removed from the original that a classification with regard to facticity values did not seem feasible (ex. 10) – these instances have been classified as 'other'. The results for the two different time spans are shown in the figures below:

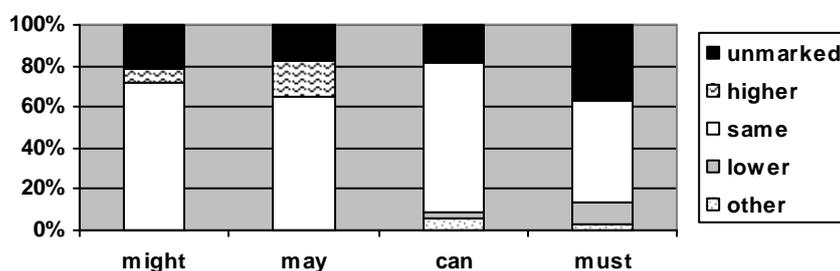


Figure 1: Facticity values in German translations of English modals 1978-1982⁷

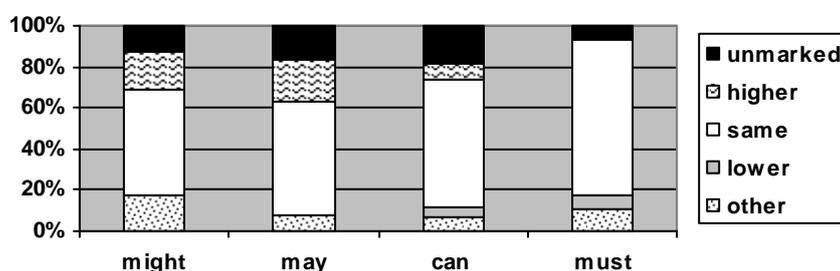


Figure 2: Facticity values in German translations of English modals 1999-2002⁸

These two figures alone show that there is no drastic diachronic change to be observed between the two time-spans. One interesting point to note is that, overall, translators seem to choose a freer, more creative translation (as exemplified in 10 above) more often in the latter time-span. This is, however, not immediately relevant for the present investigation. What is more interesting in the present context is that, apparently, translators use modally unmarked propositions as translations of *must* more often in the first time-span than in the second one. However, one should note that epistemic uses of *must* are not, on the whole, very frequent in our corpus, having an average frequency of only 5.3 (1978-1982) viz. 2.6 (1999-2002) occurrences per 10,000 words, which means 20 viz. 29 instances. Taken individually, the findings do not allow any far-reaching generalizations. However, considered together, we can certainly see a general trend:

⁷ The absolute numbers for this time span are as follows: *might* n = 14, *may* n = 57, *can* n = 105, *must* n = 20. Total n = 196.

⁸ The absolute numbers for this time span are as follows: *might* n = 148, *may* n = 184, *can* n = 327, *must* n = 29. Total n = 688. The reason for the elevated numbers compared to the earlier time span mainly lie in the corpus make-up, which contains 42,000 words of English text for the 1978-1982 time span, but 122,866 words for the 1999-2002 time span. This has to do with problems which were faced during the corpus compilation due to the fact that for the earlier time span popular scientific English texts which have covert translations into German are not easy to come by, as the genre was only becoming established in German.



Figure 3: Facticity values in German translation of English modals: 1978-1982 vs. 1999-2002

Thus, there seems to be a general preference for rendering the English expressions containing *might*, *may*, *can* or *must* with an expression with a higher facticity value – either a modal marker with a higher facticity value or a modally unmarked indicative. Translations with a lower facticity value, on the other hand, are much less frequent. We can understand this as a confirmation of our hypotheses (1) and (2): apparently, German text production conventions are indeed characterized by a preference for modal expressions with a higher facticity value as well as by an overall lower frequency of epistemic modal marking.⁹ As the translators apply a cultural filter in the process of covert translation, this German communicative preference becomes apparent in the translations. The hypothesis (3), i.e. that German translations converge over time to the communicative preferences of the English source texts, could not be confirmed with regard to the use of epistemic modals. If anything, divergence even increases over time.

One should note that the category of ‘unmarked facticity’ expressions contains all examples where the modals studied here have no corresponding modal element in the German translation. In a number of cases this means that in fact the facticity value of the whole proposition in German is truly unmarked, as in example (9). In other cases, however, the absence of a modal element in the German translation is explicable through different structural patterns characteristic of English and German, respectively. Note that the English modals have served as replacement for the subjunctive since Old English times and that they have become increasingly used in structures which used to be associated with subjunctive forms of the verb as the subjunctive forms became less and less distinguishable from the indicative (cf. e.g. Denison 1993). They are still common in these uses today. Thus, matrix verbs like *suppose*, *assume*, *suggest* etc. seem to trigger the use of a modal in the following subordinate clause, although the modal, from a semantic point of view, adds no further qualification. This can be seen in the following example:

⁹ It would be interesting to see how epistemic modal markers are dealt with in covert translations from English into other languages. The findings by Böttger/Bühlig (2003), who, however, mainly focus on deontic uses of modals, suggest that e.g. in Spanish a similar preference for modal markers expressing greater certainty can be observed, as they point out “by contrast to the Anglo-American original, certain excerpts of the Spanish text express a greater degree of probability [...] than the English, where the forecast is formulated more carefully” (Böttger/Bühlig 2003: 174).

(11) E: The researchers *suggest* that savant skills *may* be limited to a small percentage of the normal population in the same way that they are limited to a small percentage of the disabled population.

G: Die Wissenschaftler *nehmen* deshalb *an*, dass Inselbegabungen in der normalen Bevölkerung wie bei behinderten Personen nur zu einem geringen Prozentsatz vorkommen [‘The researchers *assume* therefore that savant skills occur [indicative] only in a small percentage of the normal population, just as it is with disabled people’]

The translator uses no modal element in the subordinate clause and this can be understood as being in correspondence with German structural preferences. As far as the facticity values are concerned, one cannot say, however, that the English original and the German translation differ decisively. In the follow-up to this pilot study, it will therefore be desirable to categorize such uses separately.

What we may already point out at this stage is that there seem to be fundamental differences between English and German in the field of epistemic modality. For language contact-induced changes to occur, however, the existence of equivalent means of expressions – or at least means of expressions perceived as equivalent by the bilingual speaker – is extremely important (cf. Heine/Kuteva 2005). Where such an equivalence exists, former studies conducted within the ‘Covert Translation’ project have shown many interesting contact-induced phenomena in the German covert translations from English. Sometimes such contact-induced changes could even be shown to have spread already to monolingually produced German texts in the genres where the Anglophone dominance is strongly felt (popular science, business communication). For instance, in the field of connectivity, both sentence-initial *Und* (‘And’) and sentence-initial *Aber* (‘But’), originally rare in German texts, could be shown to exhibit a rise in frequency in translations and to a lesser extent even in monolingually produced German texts (cf. Baumgarten 2007; Becher/House/Kranich forthc.). As far as *But-Aber* is concerned, even an impact of the discourse functions of the English connector on the German one could be noted. In the field of personal deixis, the use of the personal pronoun *wir* (‘we’) has been shown to be increasingly used in ways parallel to *we*, for instance for a simulation of face-to-face interaction (Baumgarten/Özçetin 2008; Baumgarten 2008). All these cases have in common that one German linguistic item is identified by the competent bilingual individual as the equivalent of one particular English form, which might lead to a certain automatization in translation choices. *And-und* and *we-wir* are furthermore very close in phonological form, rendering identification even easier.

In the field of modality, however, no clear-cut equivalence relations seem to exist, as the great deal of variation exemplified by the translations in (6) through (10) already indicated. A wide variety of forms is chosen by the translator to render a particular English modal verb, e.g. for the translation of *may* in the 1999-2002 section 184 tokens of *may* are translated by 48 different modal expressions in German. This

points to fundamental differences in the English and German inventory of epistemic modal markers,¹⁰ which will be studied in some detail in the following subchapter.

3.2 Formal Properties of Epistemic Modal Markers in English Source Texts and German Translation

While modality in English is most commonly expressed by modal verbs, in German, modal adjectives (e.g. *es ist sicher, dass...* 'it is certain that') and adverbs (e.g. *wahrscheinlich* 'probably') as well as modal particles (e.g. *wohl* 'probably, as we both can see')¹¹ are also very frequently used. Also, a combination of a modal verb with another modal element is not uncommon. This variation is reflected in the translations. The realization of English *might, may, can* and *must* in the translations can thus be categorized into the following types:

- (a) zero translation
- (b) modal verb
- (c) modal adjective/adverb/particle
- (d) a combination of several modal elements (e.g. modal verb + modal particle)
- (e) a creative translation which renders the modal meaning via other means (typically lexical choice)

Examples of (a) (ex. 9), (b) (ex. 6), (c) (ex. 8) and (e) (ex. 10) could be seen above. Examples in category (d), where the translation of the English modal verbs consists in a combination of several modal elements, show a variety of combinatory possibilities. Still, one rather common pattern emerges in this group: frequently one finds combinations of modal verbs with a modal adverb or modal particle, as in the following example:

(12) E: Estrogen replacement therapy *may* offer health benefits to some postmenopausal women.

G: Der Östrogen-Ersatz nach den Wechseljahren *kann* das Befinden mancher Frauen *durchaus* verbessern. ('The estrogen replacement after the menopause *can indeed* improve the state of some women.')

There are, however, a number of possible combinations that translators make use of. The following examples may serve to indicate a few of these: ex. (13) shows the combination of a modal adverb combined with an adverb of degree, while ex. (14)

¹⁰ Such a difference is also apparent from studies in second language acquisition which show that the correct use of German epistemic modal expressions is very difficult to acquire for the English learner (cf. Kufner 1977). Kufner (1977: 134) relates this to the fact that differences between the epistemic use of modals in English and German are difficult to explain to the learner, so that the principles of use will not be understood easily. Nehls (1989), who has studied the English translation of German modal particles, also comes to the conclusion that exact equivalences cannot be established.

¹¹ The modal particle *wohl* does not only mark the proposition as probably true, but also establishes that the evidence for assuming this is shared by speaker and hearer. It is thus impossible to modify new information using *wohl* (cf. Gast 2008).

shows how the modal marking is achieved through the combination of subjunctive verb form + modal particle:

(13) E: Moreover, the rate of infection appears to be dropping among injection drug users, although this *may* be because anti-MDS campaigns have discouraged sharing of needles.

G: Offenbar infizieren sich auch Drogenkonsumenten jetzt seltener, *vielleicht* aber *hauptsächlich* dank der AIDS-Kampagnen, in denen davor gewarnt wird, Spritzen gemeinsam zu benutzen. ('Apparently drug consumers now infect themselves more rarely, *maybe mainly* thanks to AIDS-campaigns, which warn against using needles together.')

(14) E: But if sought, the pathologically non-anxious *may* be found in emergency rooms, jails and unemployment lines.

G: Aber wenn man sich die Mühe machte, nach krankhaft furchtlosen Personen zu suchen, *fände* man sie *wohl* in Notambulanzen und Gefängnissen. (But if one made the effort to look for pathologically fearless people, one *probably find* [subjunctive] them in emergency rooms and jails.)

The following figures show the distribution of these formal categories in the translations of *might*, *may*, *can* and *must*.

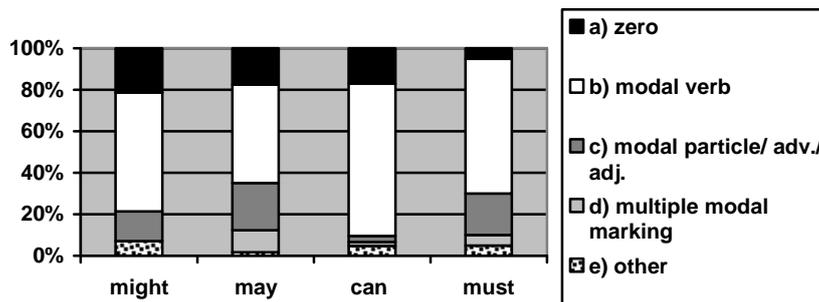


Figure 4: Formal categories of German translations of English modals 1978-1982

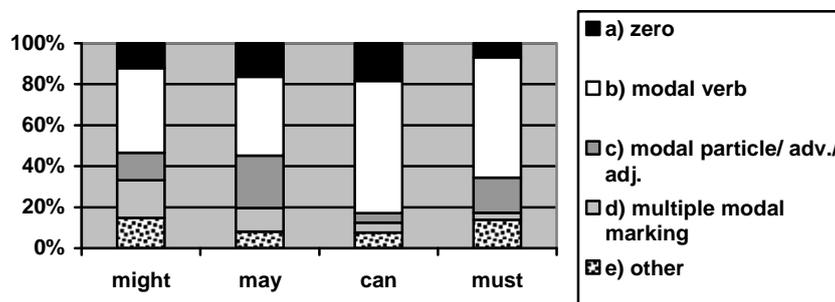


Figure 5: Formal categories of German translations of English modals 1999-2002

Again, one should note that, in regard to the single modal verbs, not all of them are frequent enough to allow great generalizations. Thus, what looks like diachronic change, i.e. that there is a great rise in the translation of *might* by modal verb + modal particle in the second time span, is not significant, as the overall number of *might* occurrences is, on its own, too low to allow generalizations. However, if one looks at the translations of all four modal verbs together, one can see general tendencies:

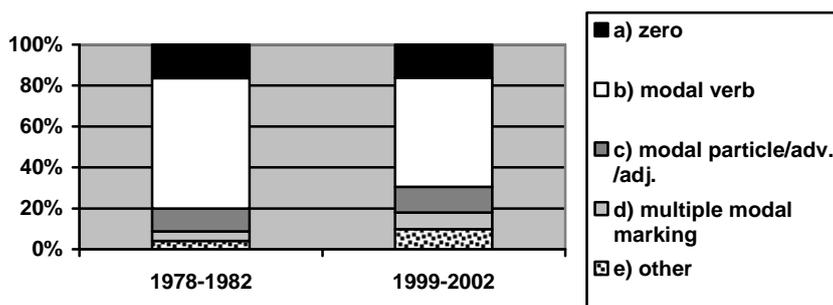


Figure 6: Formal categories of German translations of English modals 1978-1982 vs. 1999-2002

We can thus see the following diachronic development: there is a certain rise in the use of modal particles, adverbs or adjectives (c) as well as in the use of combinations of several modal elements (d). Also, the creative choices grouped together here under (e) become more frequent. The rise in categories (c) through (e) happens at the expense of the more straightforward translation of English modal verb by German modal verb. Thus, as far as the formal properties of the modal expressions are concerned, there is an increasing divergence from the English original expression.

Apparently, then, there are no contact-induced changes in the expressions of epistemic modality in the German translations of English popular science texts. Previous studies in this project have analyzed the rise in the use of “modals with an additional modality marker in their scope” (Baumgarten 2003: 15), which corresponds to our category (d), as an increase in subjectivity (cf. also the discussion in House forthc.), in so far as “additional lexicogrammatical means [...] implicitly realize the speaker on the surface of the text” (Baumgarten 2003: 16).¹² On the basis of the present study, however, an alternative interpretation presents itself: the increase in the use of multiple modal marking in the more recent translations seems interpretable as an application of the cultural filter rather than as an increasing realization of the speaker in the text. The qualitative analysis of the translations of *might*, *may*, *can* and *must* has shown that, most often in the combination of two modal elements in the

¹² Baumgarten's (2003) study presents, however, mainly quantitative results of typical contexts of the German and English modal verbs *sollen*, *müssen*, *should* and *must*, and considers each of the three parts of the corpus (English originals, their German translations, and German comparable texts) separately, rather than looking at translation relations, as was the case in the present study. This has to do with the fact that the corpus was not yet aligned at the time, so that an analysis of the exact translation correspondences was not yet feasible.

German translations, the second modal element serves to produce a higher facticity value, which, as we have seen, reflects the communicative preferences established by House (e.g. 1996, 1997) for German texts, such as the tendency to avoid indirect and vague expressions. Example (12) can be regarded as typical in this respect; a further example of this effect can be seen in (15) below:

(15) E: the best way to use these drugs *may* be in conjunction with instant tests.

G: [...] *dürften* sie ihren größten Nutzen *wohl* in Verbindung mit Schnelltests entfalten. ('[...] *should probably* show their greatest use in combination with quick-tests')

We can thus conclude that, in the field of modality, German translations of English popular science texts show no signs of convergence towards English communicative preferences, but rather diverge more and more from the model they find in the English original.

4 Conclusion

The present paper has shown that German translations of propositions containing epistemic uses of *might*, *may*, *can* and *must* exhibit a certain tendency to diverge from the original, which can be understood as the application of the cultural filter: English communicative conventions in popular scientific writing are marked by a preference for hedges and vague, indirect expressions, which are apparently disfavoured in German texts of this genre. Through the application of the cultural filter, the lower facticity values present in the translations are adjusted and the propositions occur with higher or even unmarked facticity values in the translations. There are no signs of convergence in this respect; if anything, this tendency even becomes more pronounced over time. With regard to the form of the modal markers, we could also find no signs of a convergence towards the English model. To the contrary, we find an increasing use of multiple modal marking which has no model in the English original. This can be related to the former point, as the second modal element quite often serves to raise the facticity value (a common second element being the modal particle *durchaus* 'indeed, in fact').

The resistance of German popular scientific texts to influence from the dominant English model in the field of epistemic modal marking is probably due to the absence of exact equivalences between English and German in the field of modality. The existence of equivalent means of expressions (or at least means understood as equivalent by the bilingual individual, in our case the translator) plays a very important role for contact-induced interference (cf. Heine/Kuteva 2005). While, in English, modality is mostly expressed by the core modals (which, much more than the German modal verbs, are a grammaticalized category of their own), in German, other means, such as modal adjectives, adverbs and particles, are frequently preferred, and in general a much greater variety of expressions seems to be used. One can thus say that there are fundamental differences in regard to epistemic modal marking in English and German, and these can be assumed to block interference phenomena. However, more

studies in the field of modality on our corpus are needed to substantiate the results presented here.

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