BEYOND THE APPRAISAL FRAMEWORK:
EVALUATION OF *CAN* AND *MAY* IN INTRODUCTIONS AND CONCLUSIONS TO COMPUTING RESEARCH ARTICLES*

Elena Quintana Toledo
Margarita Esther Sánchez Cuervo
Universidad de Las Palmas de Gran Canaria

Abstract

This paper attempts to analyse the presence of the modal auxiliaries *can* and *may* as markers of authorial evaluation in a corpus of introductions and conclusions to computing research articles. Bearing in mind the semantic familiarity of these two modals, we start from Martin and White's Appraisal framework, whose focus is on the interpersonal in language, the subjective presence of authors in their texts, and the stances they take both towards those texts and their readers. In particular, we extend Martin and White's notions on epistemic modality and evidentiality, which they interpret from a co-textual and contextual point of view, and use Alonso-Almeida's views on epistemicity as a pragmatic effect of evidential strategies. An important conclusion points at functional variation of epistemic and evidential readings in these two sections of research articles, with a predominant occurrence of epistemic attributions in introductions and evidential interpretations in conclusions. This result is in consonance with the type of genre selected and its authors' aims.

Key words: Appraisal, evaluation, modality, evidentiality, epistemic, research article.

Resumen

Este trabajo pretende analizar la presencia de los auxiliares modales *can* y *may* como indicadores de evaluación en un corpus de introducciones y conclusiones de artículos de investigación sobre ingeniería informática. Teniendo en cuenta el parecido semántico entre estos dos modales, tomamos como primera referencia el modelo evaluativo de Martin y White, cuyo trabajo se centra en la función interpersonal del lenguaje, la presencia del autor en su obra, y su posicionamiento con respecto a esta y sus lectores. Extendemos a continuación sus nociones sobre modalidad epistémica y evidencialidad, que interpretan desde una perspectiva cotextual y contextual, y utilizamos para ello las ideas de Alonso-Almeida (en prensa) sobre epistemicidad como efecto pragmático de las estrategias evidenciales. Una conclusión importante refleja la variación funcional de lecturas epistémicas y evidenciales en las dos secciones de los artículos de investigación, predominando las primeras en las introducciones y las segundas en las conclusiones. Este resultado concuerda con el tipo de género y el propósito de los autores.

Palabras clave: evaluación, modalidad, evidencialidad, epistémica, artículo de investigación.

1. INTRODUCTION

The relationship between the modal auxiliaries *can* and *may* has been the focus of attention of several studies aimed to specify the extent to which they can be said to be semantically close. As a matter of fact, they "share a high level of semantic overlap" (Collins, *Modals* 91) since they may both express possibility and permission. However, some slight differences have been identified, e.g. while the possibility and permission senses of *can* denote an inherent potentiality, the possibility and permission senses of *may* denote a speaker-dependent potentiality (Dirven 146). In this paper, we will analyse these two modals as markers of authorial evaluation in a corpus of introductions and conclusions to research articles (hereinafter RAs) in the field of computing. Our aim is to determine whether or not there is functional variation in the use of *can* and *may* depending on the specific communicative purposes of each section.

Different authors have studied the presence of evaluative expressions in RAs. Some of them (Crompton; Ferrari) have focused on some sections of the RAs and other authors have dealt with the RA as a whole (Chafe; Grossmann and Wirth). Our theoretical starting point for the analysis of evaluation is Martin and White's (1) taxonomy of Appraisal, which is mainly concerned with "the interpersonal in language, with the subjective presence of writers/speakers in texts as they adopt stances towards both the material they present and those with whom they communicate." In particular, we will limit our scope to their view about modality and evidentiality, which they interpret on a co-textual and contextual basis.

The present paper seeks to enrich their assessment about these expressions, mostly adopting a contextual level of analysis. Context has been shown to be crucial in the analysis of the interpersonal function of language, for instance, in the identification of hedges (Salager-Meyer, "Hedges"; "Procrustes"; "Language"). Salager-Meyer ("Procrustes" 181) upholds the position that contextual analysis, i.e. linguistic context and context of situation, together with introspection are vital to identify hedging devices. The same seems to be applicable to the study of modality and of modals in particular, as Salager-Meyer ("Procrustes" 181) notes echoing Kreutz's words: "The full meaning of communicative content [...] of items such as modal verbs and downtoning particles depends on a large degree on extralinguistic criteria like context, situation and the interlocutor" (Kreutz 218). Our purpose is then to see the frequency and form of propositional evidential and epistemic occurrences in the introductions and conclusions of computing RAs, in order to identify variation in usage. We will firstly measure the frequency of occurrence of *can* and *may* in the introductions and conclusions to then tag the actual instances as epistemic or evidential depending on the contextual interpretation. Variations in

usage, we contend, may fulfil a number of pragmatic functions such as the projection of authors' modesty, or the expression of tentativeness to make the information presented more acceptable.

2. THE APPRAISAL THEORY AND MODALITY

The Appraisal Theory stands as an effective theoretical framework for the study of evaluation in academic texts, which allows the analysis of attitudinal expressions and their source, and the writers' positioning towards the material presented and their audience as integrated in a single model (Hood 57). Martin and White (34-35) conceive Appraisal as one of the three major discourse semantic resources, together with Involvement and Negotiation, devoted to the analysis of interpersonal meaning. Within Appraisal, they distinguish three interacting domains:

(1) Attitude: it is related to our feelings, emotional reactions, and judgements of behaviour and evaluation of things.
(2) Engagement: it is concerned with sourcing attitudes and the play of different voices in relation with opinions in discourse.
(3) Graduation: it deals with grading phenomena referring to the amplification of feelings and the blur of categories.

The type of discourse that we are analysing, as far as trying to offer an objective account of results based on empirical methods, is particularly concerned with Engagement. In this category, the authors of computing RAs, as an element of verbal communication, take up a particular stance towards the value positions that are being referenced by the text, and with regard to the audience that they intend to address (Martin and White 92). Moreover, as being part of a diverse communicative background which allows for dialogistic alternatives, we categorise the utterances of the RAs that we are assessing as heteroglossic, as opposed to a monoglossic type of discourse that makes no reference to other voices and points of view (Martin and White 99).

Within the Engagement system, we underscore the semantic domain of Entertain. Entertain includes those expressions by which the authorial voice indicates that its position is part of a number of possible positions and, hence, a dialogic space is possible. This meaning category has been traditionally termed *epistemic modality* (Martin and White 104-105). According to the authors, the reader interprets the modal occurrences as a sign that the writer's knowledge is limited. The potential epistemic effect of these expressions is compatible with their dialogistic role. The authors include in this domain modal auxiliaries like *may, might, could*, or *must*; modal attributes like *it's possible that*, or *it's likely that*; circumstance adverbials like *in my view*, and some mental verbs like *I suspect that, I think, I believe, I'm convinced that*, or *I doubt*. In this line, the dialogistic perspective prevalent in the introductions and conclusions being considered is supported by the use of certain modal structures which, in any case, may hinge on other readings of propositions in the communicative context.

As regards modality, there is not an agreed definition of the term. Generally speaking, it is concerned with the speaker's assessment of the validity of the proposition in statements and questions, the obligation that s/he requires of the hearer to perform a command, or his/her readiness in an offer (Halliday). It deals with the way in which the author is going to project his/her attitude into his/her texts (Hyland, *Disciplinary*). Furthermore, modality is related to that part of language that allows us to connect our expressions of belief, attitude and obligation with what we say and write.

Scholars conducting studies on modality have traditionally accepted that there are two great semantic domains: firstly, possibility, necessity and prediction, which are roughly equivalent to epistemic modality; and secondly, permission, obligation and volition, which have been labelled as deontic or root modality (Lyons; Palmer; Coates, *Semantics*). Specifically, Palmer makes a distinction between two broad types of modality, namely, propositional and event. Propositional modality can be further divided into epistemic, i.e. "speakers express their judgements about the factual status of the proposition," and evidential, i.e. "they indicate the evidence they have for its factual status" (Palmer 8). Event modality, on its part, can be categorised into deontic, i.e. it "relates to obligation or permission, emanating from an external source," and dynamic, i.e. it "relates to ability or willingness, which comes from the individual concerned" (Palmer 9-10). As noted by Palmer, the difference between these two types of event modality lies in the sort of conditioning factors involved; in the case of deontic modality, they are external, and, in the case of dynamic modality, they are internal.

Together with epistemicity, Martin and White (109) also include evidentials within the grammar of Entertain. These have been defined as markers that qualify the reliability of information conveyed in ways such as the source of evidence of statements, their degree of precision, their probability, and the expectations concerning their probability (Mithun 89). Anderson (277) extends this definition, and adds that evidentials specify factual claims and indicate the justification available to the person making the claim. Willet (405-406), on his part, proposes that evidentiality as a grammatical source of information marking is based on a tripartite system: information can be attested, reported and inferred, the last two being indirect ways of acquiring information. The speaker or writer can obtain attested information through the senses; the reported information can be acquired from hearsay or folklore; and the inferential information can be marked as involving observable evidence (results) or mental constructs (logic, intuition, or dreams).

In this study, we will follow the analysis proposed by Alonso-Almeida about epistemicity as a pragmatic effect of evidential strategies. This author does not presuppose the speaker's commitment on a lexical basis but on a contextual basis. His working hypothesis is that evidentials are first used to indicate source of knowledge, be it sensory or inferred, and commitment and certainty are just cognitive pragmatic effects. These effects are based on the hearer's consideration of the contextual premises, and they may or may not show the speaker's initial intentions. For this author, evidentials are primarily indicators of source of knowledge. However, contextual assumptions may hint at epistemic readings as well. The notion

of judgement value is intrinsically endorsed to epistemic strategies, but this is not a primary function of evidentials and, hence, this notion should not form part of the definition of evidentiality. Alonso-Almeida, following Bermúdez (20-25), states that evidential strategies are interpreted contextually, and only thus other semantic and pragmatic values, including epistemic values, are added. Degrees of certainty can only be deduced if there is a negotiation of meaning that leads the hearer to interpret a particular evidential also as an epistemic marker, in which case the pragmatic effect could be that of probability or uncertainty. He finally concludes that the relationship between evidential and epistemic meaning is in essence (inter)subjective. Evidentiality thus involves not only an indication of the source of knowledge, but is also a deictic phenomenon that refers to the speaker and his/her complex relationship with information and its sources.

3. DATA AND METHOD

The findings have been gathered from a subcorpus of twenty computing RAs written by native speakers of English between 2004 and 2008. They have been excerpted from the *Corpus of Specialized Papers in English* (CoSPE). CoSPE is a multidisciplinary corpus including computing, legal and medical RAs which is currently being compiled at the Instituto para el Desarrollo Tecnológico y la Innovación en Comunicaciones at the Universidad de Las Palmas de Gran Canaria, as part of the research project *Evidentiality in a Multidisciplinary Corpus of Research Papers in English*.

We have restricted our search for modal verbs to two rhetorical sections of the RAs, namely, introductions and conclusions. Our methodology combines computerised searches and manual analysis: we have firstly instructed the *Online Interface for Corpus Management* (OnICoMt) to search for the modals in the introductory and concluding sections of the RAs. We have then analysed them manually in order to consider them in context and determine their value as epistemic or evidential markers. We have analysed a total of 19,341 words unevenly distributed in 13,901 words for introductions and 5,440 for conclusions. Due to the varying lengths of texts, data have been normalised to 10,000 words.

Both introductory and concluding sections to RAs have been assessed in terms of rhetorical movements or, in other words, parts aimed to fulfil specific rhetorical functions in the overall structure of these sections. Swales's (141) *Create a Research Space* (CARS) model has been quite influential in this respect. He proposes a three-move structure for introductions consisting of (i) establishing a territory, (ii) establishing a niche, and (iii) occupying the niche. Each of these moves may be accomplished in several steps: the first one may be accomplished by making centrality claims, and/or topic generalisations, and/or reviews of previous research. The second move, on its part, may be realised by making counter-claims, or by indicating a gap, or by raising questions, or by continuing a tradition. The last move normally contains an outline of the purpose of the RA or an announcement of the present research, as well as an announcement of the principal findings and indications of the structural organisation of the RA.

With regard to introductory sections to RAs in the field of computing, Anthony identifies a new move which consists of providing definitions and exemplifications of terminology. This work and the research conducted in Cooper, Ngozi-Nwogu and Samraj in the fields of electronic engineering, medicine and environmental science, respectively, show that move-structure in introductions is very much dependent on the discipline. However, as noted by Dudley-Evans ("A Key" 6), the structure in the CARS model is "frequently found in more or less its pure form in many disciplines."

Conclusions differ from introductions in that they are not always presented as an independent section in the whole structure of the RA. Sometimes, they are included in the discussion section where they occupy a closing position (Dudley-Evans, "Genre"). In the case of the RAs considered for this research, all of them present the discussion and the conclusion as independent sections. In addition, we have observed that these conclusions are structurally organised in three main moves: (i) summary of the study, (ii) evaluation of the study, and (iii) recommendations for future research.

4. RESULTS AND ANALYSIS OF FINDINGS

Our search for modal auxiliaries in the introductory and concluding sections of the RAs analysed has provided us with the individual occurrences shown in Figure 1:
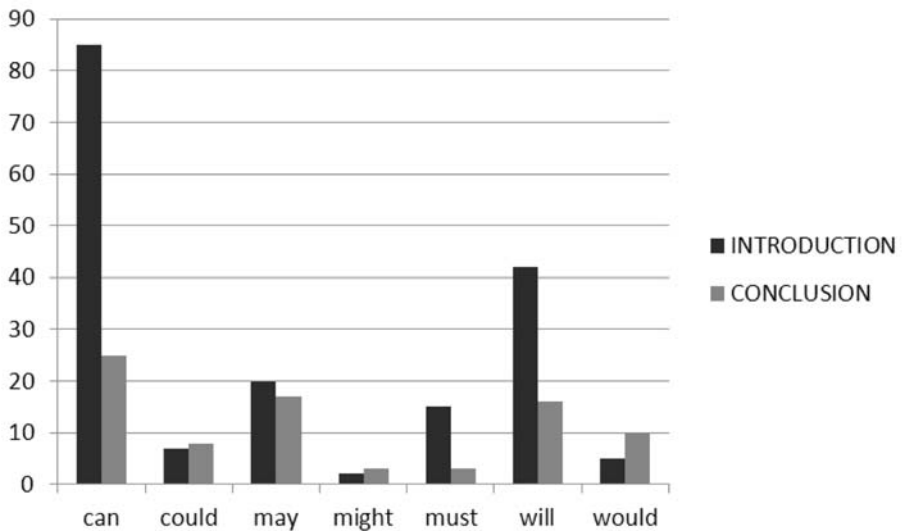

Figure 1. Distribution of modal auxiliaries in our corpus.

These results reveal a significant predominance of *can* in introductions with 85 occurrences, followed by *will* with 42 occurrences and *may* with 20 occurrences. The most frequent modal verbs in the conclusions are *can* with 25 occurrences, followed by *may* with 17 occurrences and *will* with 16 occurrences. Although occurrences of *will* are noteworthy in introductions, we shall be only concerned with *can* and *may* because of the semantic closeness these two modals exhibit.

Once the individual occurrences have been identified, they have been tagged manually after careful reading as epistemic or evidential depending on contextual factors. We should like to note here that *can* cannot be easily categorised as epistemic or evidential. In fact, many scholars would object to an epistemic interpretation of this modal since they take it to be essentially dynamic. We do not completely dismiss the dynamic sense of *can*, but this is very much dependent on contextual factors as we will show later on in this section. Figure 2 shows the normalised distribution of the primary epistemic and evidential interpretations:
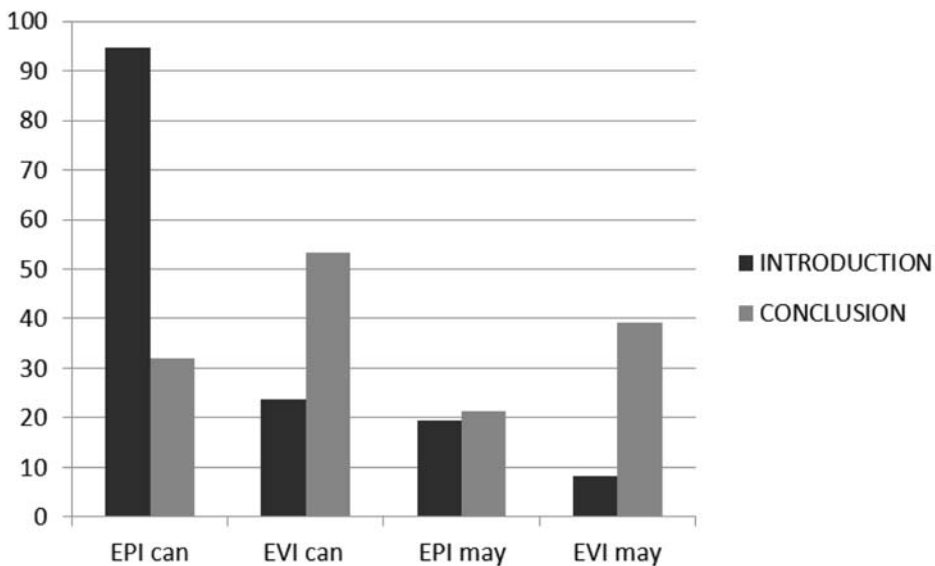

Figure 2. Distribution of primary epistemic and evidential interpretations of *can* and *may* in our corpus (data have been normalised to 10,000 words).

Introductions are characterised by a massive presence of epistemic qualifications of the modals indicating that information is frequently presented in terms of tentative possibility, and so the propositional content is left open to possible discussion, allowing writers to minimise the risk of criticism. The introductory nature of this section seems to require this sort of epistemic qualifications, but evidential ones are not completely absent. Evidential readings of *can* and *may* in introductions are related to the way writers claim a space for their work, which is primarily done by making revisions of previous research and by deriving new assumptions which, in turn, allow the authors to justify the research they undertake.

As to conclusions, being sections that try to offer a more objective, consistent result of the research posed at the beginning of the RA, there exists a prevalence of evidential over epistemic expressions. Indeed, the methods applied to prove their hypotheses and the subsequent scientific results provide writers with enough data that entail a mainly indirect perception process, emphasising the inferential process in the acquisition of information through observable results.

4.1. *Can* and *may* in Introductions

Epistemic and evidential uses of *can* and *may* in introductions constitute dialogically expansive strategies within the domain of Engagement, by means of which writers recognise the existence of alternative positions. These resources are said to belong to the subcategory Entertain which includes expressions showing authorial subjective evaluation of and/or involvement in the propositional content, frequently in the form of judgements of likelihood, e.g. epistemic *can* and *may*, and in the form of appeals to how the writer has been led to some knowledge, e.g. evidential *can* and *may*. Take the following examples as illustration:

(1) Evaluating a particular visualization technique or tool is problematic [...] A comparison is important because it identifies possible "holes" in the research area or development market. Therefore, for example, a software organization **may** have the requirement that it needs to visualize their current system with an emphasis on being able to obtain multiple views for multiple users and should also allow querying (Gallagher2008softwareCOM).

(2) In fault-based testing, the effectiveness of a technique for detecting software faults is measured in terms of faults that can hypothetically occur in a software implementation. Thus fault-based testing provides a practical means of evaluating a test criterion. However, given a large specification and a large program, considering all possible faults **may** be enormously expensive or, in many cases, infeasible (Kapoor2007testCOM).

The epistemic value attached to *may* in (1) is derived from the authorial qualification of the proposition in terms of possibility which expresses a lack of knowledge as for its truth. The information conveyed in this excerpt stands as an exemplification of a potential gap in the market, which supports the author's point as for the importance of comparing visualisation techniques in order to identify needs to be satisfied. Being aware of the fact that it is just one of a number of many other "possible 'holes'", the writer depicts the situation as a potential one. The use of *may* here results in foregrounding his/her uncertainty as to whether or not the situation described will be actualised.

May renders a primary evidential reading in (2) as it seems to indicate that the information contained in the proposition has been acquired inferentially. The evidential value is determined by the occurrence of the modal in a syntactic construction which inherently indicates speaker reasoning. Several assumptions are

activated during the inferential process, for instance, the direct relationship that holds between fault-based testing as applied to large specifications or programs and the increase in cost of such a task. Although evidential markers do not automatically lead to specific degrees of speaker commitment (Cornillie), a secondary epistemic interpretation may be possible as well. The size of a program and the degree of specificity when applying fault-based testing stand as constraints on the factual status of the proposition, so the use of *may* indicates the writer's uncertainty in its truth, providing an evaluation of the situation described in terms of possibility. Pragmatically speaking, the employment of *may* in an epistemic sense in this context may be motivated by the speaker's actual doubt on the factuality of the proposition, or by his/her desire to provide a tactful implication.

Can remains as problematic in the literature on modality since its status as an epistemic marker is still far from clear. Some scholars (Collins, "Semantics"; Huddleston and Pullum 180) posit that it may express epistemic possibility only in interrogative and negative environments. While Coates ("Expression") observes that this modal seems to be developing an epistemic meaning in affirmative contexts in American English, Collins (*Modals* 98) shows that this tendency is not only present in this variety of the language. Consider examples (3) and (4):

(3) The essential idea behind BVA is that if a boundary in the code is wrong, then some input values will have the wrong functionality applied to them and this will include values near the expected boundary. By choosing test inputs near to the boundaries in the specification and on either side of each boundary, we are likely to find any boundary shifts. However, coincidental correctness **can** affect this strategy: The wrong functionality could be applied without leading to the wrong output (Hierons2006avoidingCOM).

(4) However, the graph obtained by their algorithm prior to the addition of these special arcs is identical to the graph that would be obtained by the COA on the given system of equations; therefore, the results that we present here apply equally well to the static portion of their dynamic causal ordering. Also, our result directly applies to their demonstration of how equilibration affects the causal ordering of a system, again if one omits the integration arcs from the analysis. We conjecture that our proofs **can** also be applied to the integration arcs if one considers them to denote causation across time (Dash2008noteCOM).

In (3) *can* appears to express the writer's reservations about the occurrence of the event being referred to in the proposition, and so shows a medium-to-low level of authorial commitment. This interpretation is supported by the following sentence where the writer specifies the reason why BVA can be affected by coincidental correctness by using the remote form of *can*, i.e. *could*. They both qualify the likelihood of the actualisation of the proposition, but the sense of possibility and the level of tentativeness conveyed by *could* are weaker than those conveyed by *can*.

Admittedly, not everyone would agree with our epistemic reading of *can* because it has been traditionally considered as a dynamic modal which expresses

ability and volition (Palmer 7-10; Kranich). The emphasis here is placed on a sense of potentiality derived from the capacities of the subject/object. Dynamic modality is specifically "concerned with the disposition of certain empirical circumstances with regard to the occurrence of some event" (Perkins 252). The dynamic interpretation seems to be also possible: as noted by Biber et al., "*can* is especially ambiguous in academic prose, since it can be often interpreted as marking either ability or logical possibility" (492). In the example above *can* may mark the potentiality for coincidental correctness to affect BVA, but only an expert reader would know whether or not the technical features of the former *can* affect the latter.

Evidential interpretations of *can* are seldom referred to in earlier literature. To our knowledge, they have been recently identified in Alonso-Almeida. This modal may be taken as an indicator of the writer's source of knowledge in (4), marking that s/he has been led to the information on the basis of his/her inferential reasoning. Its occurrence in the apodosis of a conditional sentence together with the use of the lexical evidential verb *conjecture* provide harmonic reinforcement to its inferential evidential value: firstly, conditional sentences are intrinsically related to reasoning processes and, secondly, the verb *conjecture* denotes that the writer has some grounds, probably of an inferential nature, to suppose that the situation described *can* obtain. At the same time, these syntactic and lexical choices serve to add an epistemic meaning to the propositional content lessening the degree of authorial commitment. Finally, a dynamic reading would be acceptable on the basis of the reader's knowledge on the characteristics of integration arcs and their relation to the notion of causation across time.

4.2 *Can* and *may* in Conclusions

In contrast to introductions, the utterances found in conclusions can be generally classified as dialogically contractive, whereby they try to restrict the scope of dialogically alternative positions (Martin and White 102). Reporting verbs typical of this section are *demonstrate*, *show*, *reveal*, *provide*, and *present*. These instances adopt a particular stance towards the attributed proposition, holding it to be true or valid after the experiments conducted. The preponderance of evidential over epistemic attributions supports this position, and so the reader understands that the conclusions offered mostly derive from an empirical procedure based on results previously tested. In the case of *may*, we present these examples:

(5) We have developed and presented a framework for the assessment of the capabilities and evaluated six tools in this framework. It turns out that no one tool meets all of the criteria of our framework. This is not a bad thing. Moreover, it **may** be that a one-size-fits-all approach **may** increase information overload and that a collection of small tools appropriate to each stakeholder's task **may** be preferable (Gallagher2008softwareCOM).

(6) Although implemented using texture and intensity features to drive the segmentation, the framework that has been proposed is completely flexible, allowing

the straightforward inclusion of further features or modalities. In particular, ongoing experiments on color images have shown good performance, with motion another possible candidate for integration. Future work **may** also include the use of model-based parametric measures of region similarity, as well as modification of the split termination rules, which are potential vulnerability of the current method (O'Callaghan2005combinedCOM).

In (5), the triple incidence of epistemic *may* pertains to low possibility in relation with future investigations. The authors show authorial hesitation after stating "that no one tool meets all of the criteria" of their framework. After estimating that their result is not bad, the additive conjunct *moreover* underscores "a one-size-fits-all approach" in a prospective examination that appears to have more possibilities of success. Likewise, the use of *preferable* in the final utterance hints at a personal preference and supports the rhetorical move of recommendations for future work. At the same time, a secondary evidential reading could be understood if we interpret the utterances with *may* as necessary consequences of the stated framework. This other less probable notion extends the inferred reasoning to the "one-size-fits-all approach" and "the collection of small tools" favoured by the authors.

In (6), the use of the verb *show* underscores the perceptual aspect of the acquisition of information after the facts (Marín Arrese, "Evidential" 173). To this respect, the subsequent reading of evidential *may* seems to follow in the same mode of knowing and sustains "the good performance" of the experiments completed. In this utterance, the additive adverbials *also* and *as well as* contribute to sustaining this evidential reading. However, a secondary epistemic attribution could be interpreted if we judge the utterance as plain speculation. In this sense, the modal auxiliary is part of the rhetorical move that includes recommendations for future investigations.

As regards the occurrences of *can*, we include these instances:

(7) We have introduced the concept of a lighting sensitive display that constantly monitors the illumination of its environment and modifies its content accordingly. We presented an initial implementation of this concept. As mentioned earlier, an ideal LSD would be one that **can** sense the complete 4D illumination field and produce a fully controllable 4D light field in response (Nayar2004lightingCOM).

(8) The trace of Algorithm 3 in Table III suggests that the slopes of the paths Pl and Pr are the continuants of the continued fraction expansion of v=u; this is indeed the case. Thus our discussion **can** be tied to continued fractions and many other applications of Euclid's algorithm such as finding paths in the Stern-Brocot tree or finding the shortest factorization in elementary matrices of a 2 £ 2 integer matrix with determinant 1 [...] (Harris2004lineCOM).

As commented on subsection 4.1 about the use of *can* in introductions, this modal does not always provide a definite status. In (7), *can* appears to function as a hedge modifying the status of the whole proposition. Hedges can be generally taken as resources aimed to lessen the degree of authorial commitment to the truth

of propositional information (Hyland, *Hedging* 1). In this sense, this modal verb shows epistemic qualification manifesting tentative possibility or even speculation, and so a scientific claim is made non-assertively. Furthermore, the possibility meaning is reinforced by the use of the epistemic modal *would*. It is a distal form as regard a weak form of potentiality, or some reference to some prior speech event. Epistemic *would* also implies that the speaker believes that s/he has conclusive objective evidence for the truth of the proposition encoded in the utterance (Marín Arrese, "Effective" 36). The primary epistemic reading conveys a wish on the part of speakers about "an ideal LSD" that improves the one they have presented and, as such, it manifests a rhetorical effect of concluding sections. A further dynamic reading, also functioning as a device to downtone assertiveness, would allow the LSD being capable of sensing those anticipated outcomes.

Example (8) reflects a primary evidential attribution. The verb *suggest* indicates a deductive reasoning. In particular, the use of this verb emphasises that the information has been accessed by a reasoning process (Marín Arrese, "Evidential" 172). The subsequent affirmation that "this is indeed the case" reinforces this idea. The inclusion of *thus* introducing a series of previously tested effects makes *can* partake of the same inferential process, which favours this evidential reading. As it occurs with the analysis of evidential *can* in the introductions, a dynamic reading could be seen if the readers estimate that the writers' discussion is indeed "tied to continued fractions and many other applications of Euclid's algorithm." In other words, the authors would indeed consider that their discussion possesses prospective uses.

5. CONCLUSIONS

In this paper, we have analysed the presence of evidential and epistemic modal auxiliaries *can* and *may* as markers of authorial evaluation in a corpus of introductions and conclusions to RAs on computing. In relation to their communicative goal, we first categorised them attending to Martin and White's Appraisal framework, whose main concern is with the subjective presence of writers in texts and the stances they take both towards the value positions referenced by those same texts and their readership. Martin and White consider modality and evidentiality as part of the category of Engagement, by which texts are deemed heteroglossic to the extent that they allow for dialogistic alternatives. In the case of introductions, the presence of epistemic and evidential uses of *can* and *may* are part of dialogically expansive strategies, by which writers recognise the existence of diverse positions. In contrast, in conclusions the occurrence of these modal auxiliaries can be considered dialogically contractive, because they constrain the scope of different positions.

As to the study of epistemic and evidential attributions, we followed Alonso-Almeida's views (partially based on Bermúdez and Cornillie) on epistemicity and evidentiality as differentiated semantic categories, i.e. the expression of mode of knowledge does not necessarily correlate with degrees of speaker commitment. Epistemic rather than evidential interpretations of these modals prevail in the introductions, while the opposite is true in conclusions. Co-textual and contextual

analyses have shown that, when used as epistemic markers, *can* and *may* are not automatically understood as conveying the writer's uncertainty concerning the validity of propositional information; given the genre, they may be used to avoid face-threatening intervention on the part of the authors. When used as evidential markers, these modals function primarily as indicators of an inferential mode of knowledge. Extra pragmatic values, i.e. epistemic, may be added on the basis of the reader's evaluation of the whole communicative situation.

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