Applying cognitive linguistics to instructed L2 learning

The English modals

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This paper reports the results of a quasi-experimental effects-of-instruction study examining the efficacy of applying a Cognitive Linguistic (CL) approach to L2 learning of the semantics of English modals. In spite of their frequency in typical input, modal verbs present L2 learners with difficulties, party due to their inherent complexity — modals typically have two divergent senses — a root[1] sense and an epistemic sense. ELT textbooks and most grammar books aimed at L2 teachers present the two meanings as homophones, failing to address any systematic semantic patterning in the modal system as a whole. Additionally, ELT texts tend to present modals from a speech act perspective. In contrast, CL analyses (e. g., Langacker 1991; Nuyts 2001; Sweetser 1990; Talmy 1988) offer both a systematic, motivated representation of the relationship between the root and epistemic meanings and a rather precise representation of the semantics of each modal. To test the pedagogical effectiveness of a CL account of modals, an effects-of-instruction study was conducted with three groups of adult, high-intermediate ESL learners: a Cognitive treatment group, a Speech Acts[2] treatment group, and a Control group. Results of an ANCOVA indicated that the Cognitive treatment group demonstrated significantly more improvement than the Speech Acts treatment group. The experiment thus lends empirical support for the position that CL, in addition to offering a compelling analytical account of language, may also provide the basis for more effective grammar instruction than that found in most current ELT teaching materials.

Introduction

For many years, practitioners in second language (L2) learning research and pedagogy have focused their attention on issues of methodology and psychology, such as the importance of interaction or short-term memory in L2 learning, with little regard for the underlying model of language being assumed. Larsen-Freeman (1996), among others, has argued that linguistic research outside of the areas of pragmatics and discourse analysis have seemed to offer L2 teachers and learners little in the way of useful presentations of grammar or lexis. Recently, L2 practitioners have begun to turn their attention to the potential insights of a relatively new approach to linguistics, Cognitive Linguistics[3] (CL), which offers both a usage-based analysis and a fresh view of the structure of language (e.g., Achard & Niemeier 2002; Boers & Lindstromberg 2008; De Knop & De Rycker 2009; Dirven 2001; Ellis & Cadierno 2009; Holme 2009; Pütz, Niemeier & Dirven 2001; Radden & Dirven 2007;

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Robinson & Ellis 2008; Tyler & Evans 2002). The evidence is mounting that CL can provide motivated, precise explanations of linguistic phenomena, including some of the most difficult areas for L2 learners, such as prepositions, phrasal verbs, conditionals, and articles (e.g., Dirven 2001; Radden & Dirven 2007; Tyler & Evans 2003). Using English modal verbs as a lens, this paper considers the usefulness of a CL approach to instructed L2 learning. Two key goals are to provide an analysis of the English modal verbs that is accessible to ELT professionals and language learners, i.e., not overly burdened with jargon and theoretical discussion, and to offer experimental evidence, in the form of the results of a quasi-experimental effects-of-instruction study, that such applications of the theory can form the basis for L2 research and effective teaching materials.

The article first presents a comparative overview of the speech act approach to modals, which is the basis for most current ELT materials, versus a CL-based approach. In the course of the comparison, we present several key tenets of each approach and establish that a CL analysis of modal verbs (Sweetser 1990; Talmy 1988; 2000)[4] provides a more systematic, precise explanation than those offered by a speech act analysis. Next the article presents a quasi-experimental effects-of-instruction study that offers support for the effectiveness of using a CL approach to teaching the modals. Finally, we end with a few words about future directions.

The English modal verbs

A basic overview

English, like many languages, has a system to represent the speaker's attitude relating to permission, ability, and obligation within social situations when giving advice, suggestions, permission, orders, and so on, and commitment to surety in predictions and reasoning. In English these attitudinal colorings are expressed by the modal verbs (as well as adverbial phrases such as *is likely, is probable*, etc.). The modal verbs include *can, could, will, would, shall, should, may*, and *might.*

The semantics of modal verbs involves the strength of the speaker's position and aspects of status among the participants in a speech event.

(1) a. *You could get more exercise.*
b. *You must get more exercise.*
c. *You should get more exercise.*

Advice using *could* is interpreted as weaker than advice using *must*. Native speakers of English would likely interpret sentence (a) as a friendly suggestion rather than directive advice. In contrast, the use of *must* in sentence (b) carries a strong sense of directive force and could even be considered a command in certain contexts (e.g., *You must finish writing this contract before 5 o'clock or the firm will have to let you go*). The appropriateness of using the stronger form is generally tied to the speaker's status vis-à-vis the addressee, for instance in the case of a doctor speaking to a patient, or the intensity of the speaker's feelings. When *should* is used to give advice, as in (c), it introduces a moralistic dimension not found with *could* or *must*.

An additional complexity is that almost all English modals exhibit two meanings, one involving the external, physical-social world of ability, obligation, or permission, often called the *root* meaning, and a second meaning involving speaker-internal mental reasoning and logical conclusion, called the *epistemic* meaning. Root meaning is illustrated in:

(2) *The doctor said I should get more exercise.*

Here the speaker is expressing the strong social obligation imposed by the doctor. Epistemic meaning is illustrated in:

(3) Doorbell rings. Speaker: *That should be John now*.

Here the speaker is indicating the strong belief in the conclusion that the unseen person at the door is John.[5]

Speech Act view

An examination of 10 current ELT texts showed that modals tend to be presented from a speech act perspective. Since several modals can occur in the same speech act and each modal can occur in more than one speech act, under the speech act presentation their distribution and meaning appear to be largely idiosyncratic. As demonstrated above, native speakers of English have intuitions about the subtle differences in meaning among the modals as they occur in a particular speech act, however, precise definitions of the modals which would clarify these differences in meaning have been largely lacking in ELT textbooks and pedagogical grammars. Current speech act accounts leave both the teacher and the learner with the impression that the only approach to mastering modals is to memorize formulaic expressions for each speech act, and the particular modals which happen to occur in those expressions. Indeed, Celce-Murcia and Larsen-Freeman (1999) have noted that acquiring modals is one of the most difficult aspects of L2 English precisely because of their seemingly idiosyncratic nature.

A representative approach to the teaching of modals from a speech act perspective is provided in Werner and Nelson (1996) *Mosaics 2: A Content-based Grammar,* which is aimed at advanced-intermediate learners. For instance, *may/might/can/could* are represented as relating to expressing ability and possibility; *may/can* as relating to granting permission; *may/could/can* as relating to asking for permission; *would/could/will/can* as relating to asking for assistance. Even from this brief overview, we can see that *could* occurs in the categories of ability and permission, asking for permission and asking for assistance. *Can* appears in all four. No explanation is given for this distribution. Moreover, the relationship between the root uses and the epistemic uses is completely ignored. Hence, any systematic patterns of usage remain unexplored. This results in a fragmented picture of the lexical class in question, leaving the learner with the impression that the various uses are arbitrary.

Perhaps even more problematic is the lack of precision introduced by presenting the modals in this particular fashion. The subtle yet fundamental differences in speaker's attitude signaled by modal verbs such as *might* versus *should* are obscured as the presentations list several modals together as functional equivalents that are essentially interchangeable when giving advice (or performing other speech acts).

The informed teacher, of course, might be able to help her students come to an integrated, accurate account of the modals based on this limited speech act approach, but this presupposes that the teacher has been able to construct an accurate and systematic understanding of the modal system.

Unfortunately, most traditional and pedagogical grammars, even corpus-based ones (e.g., Biber et al. 1999), simply do not provide teachers with such an overview. For instance Biber et al. represent *can, could, may, might* as the modals of 'possibility' and *will/would/be going to* as the modals of 'prediction.' This presentation has a number of problems. First, the difference between 'possibility' and 'prediction' is blurry. Consider the following sentences:

(3) a. *That could/may/might be John.*
b. *That will/would be John.*

Both groups of modals would seem to convey the speaker's sense of the possibility of a particular situation or the speaker's prediction about a situation. How the two categories differ remains a mystery. It may also be noted that with the exception of *can,* all modals are used to indicate logical prediction or the speaker's assessment of logical possibility in their epistemic uses. So singling out a

subset of the modals as indicating either possibility or prediction fails to address the epistemic uses of *must* and *should*, and so on. Conversely, placing *can* with *could, may*, and *might* as indicating possibility seems to suggest that *can* has an epistemic use, a conclusion that is not accurate. As with the ELT textbooks, speech act-based grammars offer no explanation as to the relationship between root and epistemic uses of the individual modals. Rather, they simply offer examples of utterances which fall into the two categories.

Finally, the typical speech act presentation notes that a limited set of modals (*can/could*, *may/might, shall/should,* and *will/would)* have past tense forms. However, no discussion of the fact that *could, might, should*, and *would* are regularly used in non-past situations is included. For instance, the speech act approach offers no explanation as to why the past tense *should* can be used to make statements about the future, such as "Given my calculations, Karen should be here in an hour."

It is our estimation that most language teachers would be at a loss to discern systematic, motivated patterns from these accounts (see Tyler 2008 for a fuller review of the representation of modals from the 1999 corpus-based *Longman Grammar of Spoken and Written English* by Biber et al. (1999). This is a grammar specifically aimed at L2 teachers).

A cognitive linguistic account

Several cognitive linguists have developed alternative analyses of the semantics of modal verbs. For the purposes of our analysis, we draw primarily on Sweeter (1990) and Talmy (1988; 2000), who base their analysis on force dynamics. Specifically, they argue that the root meanings of modals have to do with physical forces, forward motion, and paths. Further, there is a systematic, metaphorical mapping between our understanding of these physical forces and our understanding of conceptual forces and paths, which is reflected in the epistemic uses. Here we primarily follow Sweetser's analysis, which emphasizes intentional, directed forces and paths and their metaphorical extensions.

A key tenet of CL is that our spatial-physical-social experiences structure much of our cognition and this structure is reflected in language. In other words, humans regularly think about events and experiences in one conceptual domain (e.g., reasoning and logical prediction) in terms of another domain (e.g., the spatial-physical-social); this is thinking metaphorically. A wealth of studies (e.g., Boroditsky 2000; Gibbs 1994, 2006; Spivey 2007) shows that metaphorical thinking is a ubiquitous cognitive process which shapes human cognition in many vital ways. Specifically, our observations of the external, spatial-physical world, such as basic force dynamics (e.g., motion of entities along a path and types of forces that cause forward motion), provide important event schemas that we use to reason and talk about the non-physical. This pattern is found in many uses of English, not just the modal verbs. One example of how language from the realm of physical perceptions is used to describe mental operations involves the use of verbs of perception to talk about the mental operation of understanding.

(4) a. *I see your point.*
b. *I hear what you're saying.*

Lakoff and Johnson (1980) have also pointed out that verbs of physical manipulation are used to talk about mental operations. So when English speakers want to convey their degree of understanding of an issue, they may say something like:

(5) a. *I have a good **grasp** of the issues.*
b. *I don't have a good **grip** on the theory.*

English speakers also use general language of physical compulsion, forward motion, and paths to talk about internal states of understanding and reasoning:

(6) a. *Her carefully developed argument **forced** me **to move from** my original **position**.*
b. *He **swayed** the crowd **to his side** with his passionate speech.*
c. *My thoughts were **racing ahead to the next point** in the argument.*
d. ***Part way through** his argument, he suddenly **changed direction**.*

As Sweetser (1990) argues, "a pervasive and coherently structured system of metaphors underlies our tendency to use vocabulary from the external domain in speaking of the internal domain" (p. 49).

Historically, the English modals developed from non-modal lexical items that first expressed physical strength or social obligation; for instance, *may/might* derive from *magan* 'be strong' (clearly physical strength) and *must* derives historically from *moste*, the past form of *mot*, meaning 'obliged' (clearly social obligation). The general pattern of historical development for modal verbs was that the semantics and usage of the non-modal forms gradually extended to root modal meaning and later broadened to epistemic meaning. Sweetser (1990) argues that these historical changes are systematically motivated by the ubiquitous cognitive pattern of using language from the external world to express aspects of the internal, mental world. She further notes, "Thus, we view our reasoning processes as being subject to compulsions, obligations, and barriers just as our real-world actions are subject to modalities of the same sort" (p. 50). Sweetser also emphasizes that physical forces are not objectively similar to our mental processes, but rather that humans' experience of the physical world and the domain of reasoning share a certain amount of common structure which allows metaphorical mappings between the two.

In her analysis, Sweetser (1990) offers distinct root meanings for each of the modals based on different kinds of forces emanating from different sources. Here we will consider her representations of *must, need to, may*, and *can.* The root meaning of *must* is represented as an irresistible force directing the subject or mover toward an act, an irresistible compulsion imposed by someone else, as in the following, from a high school policy statement:

(7) *You **must** get your research paper in by the deadline or you will not be allowed to graduate with your class.*

Here the compelling force is the authority of the institution which is imposing the writing of a research paper on the student. In distinction from *must*, Sweetser represents *need to* as a compelling force imposed by something **internal** to the actor. For instance, in *I **need to** get a haircut,*[6] the internal force involves the speaker's desire to have a particular groomed appearance. Sweetser illustrates the semantic distinction in the following sentences:

(8) a. *I **need to** get this paper in, but I guess I'll go to the movies instead.*
b. ?? *I **must** get this paper in, but I guess I'll go to the movies instead. (p. 54)*

Here we can understand that an internal force, even if it is strong, can be rejected by the speaker/actor, thus accounting for the acceptability of a), while the compelling external force is irresistible, thus accounting for the oddity of b).

May is represented as a situation in which an authority figure takes away or keeps away a potential barrier that would prevent the doer from undertaking some action. In other words, keeping the barrier at bay has the result of allowing the doer to perform the action. Thus, the meaning focuses on the lack of restriction imposed on the doer by someone else who has the authority or power to impose the restriction, and hence the interpretation of permission granted by an authority who could potentially block the doer's action. In contrast, *can* is represented as a positive physical or social ability on the part of the doer, analogous to potential energy in physics. The energy or ability emanates from the doer. Sweetser (1990) argues that if we assume that the domain of reasoning is

understood in terms of the social-physical world, we have an accurate, motivated explanation for the systematic polysemy of root and epistemic meanings found with virtually all the modals. Thus, each epistemic modal usage is metaphorically correlated with that real-world modality which is its closest parallel in force-dynamic structure. In terms of *may,*

> "we can see why general sociophysical potentiality, and specifically social permission, should be …chosen as analogous to possibility in the world of reasoning. *May* is an absent potential barrier in the sociophysical world, and the epistemic *may* is a metaphorically extended case to the world of reasoning. The meaning of epistemic *may* would thus be that there is no barrier to the speaker's process of reasoning from the available premises to the conclusion expressed in the sentence qualified by *may…*" (Sweetser, 1990: 59)

Sweetser offers the following examples:

(9) a. *John may go* = John is not barred by authority from going.
b. *John may be at the party* = I am not barred by my premises from the conclusion that he is there. (p. 59)

The epistemic uses of *might, could, will, would, must, shall, should*, and so on all represent parallel extensions of the particular forces and barriers indicated by the modal in the social-physical world to the domain of reasoning and logical prediction.

As Sweetser points out, if root modals are understood as referring to speech acts, such as permission or advice, it is almost impossible to account for their epistemic uses. From a speech act perspective, the *may* of permission, as in *You may leave the table* seems to have little connection to epistemic *may* as in *That may be John now.* For the L2 learner, presentations of modals solely in terms of speech act uses have the result that, rather than creating a systematic schema to understand and learn modal usage, all the various uses of each modal must be memorized piecemeal.

So far we have seen how metaphoric extension of force dynamics into the domain of reasoning is a key conceptual metaphor for explaining the modal verbs. A second metaphor central in our analysis of modals is the proximal-distal metaphor, NOW IS HERE — THEN IS THERE. In general, this conceptual metaphor involves English speakers' use of tense to code non-temporal information and maps proximal and distal spatial phenomena and their real world consequences to temporal language. An important reflex of the proximal-distal metaphor involves the use of present tense to indicate a higher degree of surety, realis, and speaker force, in contrast to the use of past tense to indicate a lower degree of surety, irrealis, and an attenuation of speaker force or control. Experientially, humans are much surer of the reality that they can immediately perceive with their physical senses than they are of the reality that is out of range of their physical senses. This includes being surer of that which is experienced in the immediate moment than that which we remember. Thus, present tense is used to express higher degrees of surety, realis, and force than is past tense. The metaphor explains the systematic lessening of surety and realis indicated by the use of historically past tense modals. Thus in the present/past pairs *will/would, can/could*, and *shall/should*, we find the past tense forms consistently indicating less surety on the part of the speaker or less social and/or physical force. For example, in legal discourse *shall* indicates a legally binding circumstance while *should* indicates a preferred, but non-binding circumstance.

This metaphor also offers a coherent explanation for politeness phenomena. An important aspect of entities being physically proximal is that they are potentially under our physical control. If a parent wants to control an unruly two-year-old, physical constraint, and hence physical proximity, is often required. In many situations, humans have learned to use language to assert control in lieu of physical control. In situations of possible imposition (or face threat), English speakers tend to

make requests, offer invitations, and so on, using the past tense, even when there is no implication of reference to past time. Following the logic of the conceptual metaphor THEN IS THERE, using the past tense implies that the speaker is physically distant from the addressee and therefore cannot exercise physical control over the addressee. The further implication is that the addressee is free to agree to or reject the imposition. It is always more pleasant to feel one has the choice to agree rather than feeling that one is being forced to agree. Hence, the metaphor accounts for otherwise puzzling uses of past tense to indicate politeness. Fleishman (1990) cites the following as a conventionally polite way to issue an invitation:

(10) *Hi, are you busy? I* ***was*** *hoping you* ***were*** *free for lunch.*

The typical interpretation is that the hoping continues into the moment of speaking, not that it is in the past. Indeed, it would seem quite odd for a speaker to announce such a hope if it were no longer the case that she/he wanted to invite the addressee to lunch. This example is exploiting the implication of physical distance, cued by the use of past tense, which gives a nod to the polite fiction that the addressee is freer to accept or reject the request. The modal verbs reflect this systematic pattern of present and past tense in the uses of the historically past tense modals *could* and *would* as the polite forms of *can* and *will* to make requests, suggestions, etc.

A CL-based analysis of modals grounded in force dynamics and metaphorical extension allows for a principled explanatory representation of the semantics of these modals. Sweetser (1990) has provided precise, distinct definitions of each of the root meanings and their epistemic counterparts. Drawing on the notion of conceptual metaphor and embodied meaning, CL also offers a systematic account of the relations between the historically present and past modal forms.

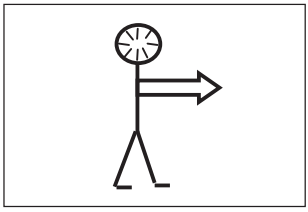
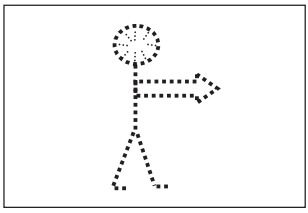
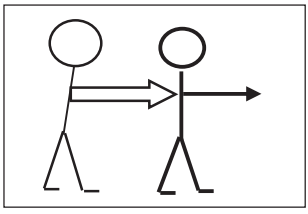
Moreover, the emphasis on embodied experience and force dynamics within the spatial-physical world allows Tyler (2008) to represent the meaning of each modal with diagrams or depictions of scenes, rather than relying solely on linguistic propositions or dictionary definitions.[7] These diagrams rather straightforwardly capture the nuanced differences among the various modals. This allows for detailed, accurate specification of the meaning of the modals with a minimum of technical explanations or jargon, thus offering the possibility that the CL-based visual representations of the modals are more accessible to language learners.

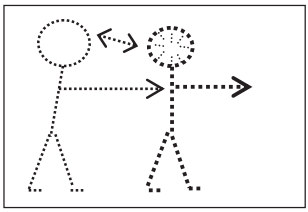
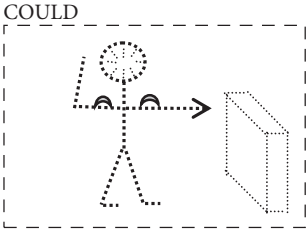
Figure 1 attempts to represent Sweetser's analysis of *will*, *would must*, *should*, *could can*, and *may* with a minimum amount of jargon or explanation.

Some explanation is needed in order to interpret the diagrams. The first column represents the social/physical (or root) interpretation of the modal. The second column offers a metaphoric translation of the root use into the logical reasoning (or epistemic) use. The third column provides examples of logical reasoning uses.

The actor/mover is the figure walking forward. Internal force is represented by lines in the actor/mover's head, as in the representation of *will.* Double arms indicate greater force than single arms, as in the representations of the external authority in *must* versus the external authority in *should*. Historically present tense modals are represented in solid lines. Historically past tense modals are represented in dotted lines.

If we take the representation of *will* in the first column, the actor/mover is moving forward along a path. The extended, double arms are meant to represent strong forward momentum. The lines inside the actor's head indicate that the force is internally generated, coming from the actor's own desire or ability. The solid lines indicate this is the present tense form and thus the stronger form of the modal.

Physical/Social	EXTENSION	Predictive/Reasoning **SITUATION: SOMEONE IS KNOCKING AT THE DOOR. THE SPEAKER CAN'T SEE WHO IT IS**
WILL 		
Force comes from actor/mover. Absolute certainty or commitment or desire → future implied *You will finish the paper today*=strong command from superior *Don't worry, you will finish this paper today and then you'll feel much better*= strong encouragement	*Just as I am sure about the state of the world and my commitments, the evidence leads me to the absolute certainty of my conclusion.*	*That will be Liz at the door.* I have no question that Liz is knocking at the door. All the information I have leads me to this conclusion. Very strong certainty. Not used very often.
WOULD 		
Strong, but slightly weakened commitment or desire= *You would finish this paper today (if you work all afternoon)* Speaker is making a strong suggestion.	*The evidence gives strong support for my conclusion, but there is a little room for doubt or lessening of my desires.*	*That would be Liz at the door.* 'I think there is a very good chance that Liz is at the door. There is a small chance it is someone else, like the next door neighbor who often drops by.
MUST 		

Outside authority Irresistible force *You must finish this paper today* (or you'll fail the course) *You must be happy you took this course. (*After all, you earned an A+ and the professor has offered you an assistantship in his lab).	*The evidence is so strong it forces me to the conclusion.*	*That must be Liz.* The information is so strong that I am forced to conclude Liz is at the door. Very high certainty. Often indicates the speaker has considered a couple options, then come to a very strong conclusion.
SHOULD  3 forces: strong outside authority; the actor/mover's recognition of the legitimacy of the outside authority; mover's internal force (somewhat weakened). Often signals a sense of obligation. *You should finish this paper today. (You know it was due yesterday and the professor said he'll take points off for late homework*) Speaker is indicating outside force and also appealing to the listener's sense of responsibility or obligation.	*If all the evidence holds, or all the events follow according to the way they have in the past, or if everything follows the rules, then I can conclude X.* (Past experience acts like the external authority; mover recognizes the legitimacy of the outside authority)	*That should be Liz.* The information strongly suggests that it is Liz. Speaker was probably expecting Liz and no one else. If events are following their planned or expected course, Liz is knocking at the door.
COULD  Weakened ability to under-take action. Implies possibility. *You could finish the paper today.* Speaker is indicating a possibility; making a suggestion that doesn't imply the speaker is attempting to put pressure on the mover.	The evidence provides weakened support to possibly conclude X, but other evidence suggests a different conclusion	*That could be Liz* = Some of the facts suggest that there is a possibility that Liz is at the door. Other facts suggest someone else is at the door. The speaker is not sure who is at the door. There is a possibility it is Liz.

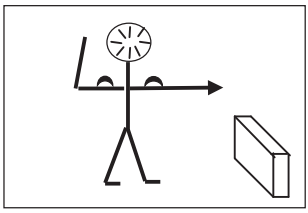
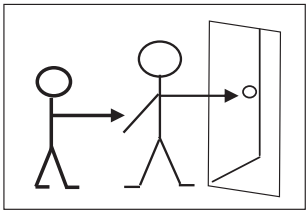
CAN		*CAN
		
Indicates ability or know how. I know I can lift 100 pounds. Nancy can multiply huge numbers in her head.	This is the only modal that specifically relates to ability. Doesn't have an epistemic extension.	
MAY		
		
External authority allows action, takes away possible barrier to action. You may leave whenever you are finished.	*Nothing bars me from concluding X* (but nothing compels me to conclude this)	*That may be Liz.* = 'The speaker is not sure who is at the door. There is no evidence barring the speaker from concluding it is Liz, but neither is there strong evidence indicating that it is Liz.

Figure 1. Considering the English Modal Verbs from a FORCE DYNAMIC PERSPECTIVE

The diagram for *must* involves an external authority, represented by the larger figure with double arms, which is directly placing pressure on the actor/mover's back. This represents irresistible force. This contrasts with the representation for *should* which involves both internal and external forces. In this diagram, the larger, external authority is pushing on the actor/mover's back. There are also lines inside the actor/mover's head indicating internal motivation. The actor/mover's recognition of the external force's legitimate authority is represented by a double-headed arrow between the external authority and the actor. It is this recognition of the legitimacy of the external authority on the part of the actor/mover that gives *should* a moral dimension in certain contexts.

Experimental support for the approach

To examine the efficacy of using a CL-based approach to teaching the modals, a quasi-experimental effects-of-instruction experiment was conducted.

Participants

The 64 participants were matriculated college students who had received at least a score of 80 on the Internet-based TOEFL test or its equivalent. Institutional specific tests indicated that they needed ELT support. They were judged to be at an advanced intermediate level. Nearly all were graduate students. Most were majoring in science or finance-related fields. Participants spoke a wide assortment

of L1s, including Chinese, Arabic, Turkish, Farsi, Korean, Spanish, Portuguese, Russian, Kazakh, and French. Over half were native speakers of Chinese. Most had resided in the U.S. or another English-speaking country for less than a year. As part of their regular classroom instruction, the participants were presented a unit on the modals.

The participants were divided into three groups. 38 participants were in the Cognitive treatment group and 16 were in the Speech Act treatment group. Ten were in a control group which took the pre and posttest but received no instruction on the modals; the purpose of this testing was to ensure that learning did not take place simply by taking the test twice.

Design

Table 1 summarizes the overall design of the study: Both the cognitive treatment group and the Speech Act treatment group took a pretest on the first day. The second day of treatment, each group received teacher-fronted instruction on the modals followed by pair work that focused on appropriately using these modals in various scenarios. The third day, both groups participated in computer-delivered self-instruction, followed by a posttest. Care was taken to ensure that both groups spent equal amounts of time on task and both received equal amounts of exposure to the modals. The control group simply took the pretest and several days later the posttest. They received no classroom instruction on the modals. In order to provide adequate explanation for the Cognitive group, as well as practice using the forms appropriately, it was decided to target only four modals: *could*, *would*, *should*, *must*.

Table 1. Overview of Experimental Procedure

Group	Session 1	Session 2	Session 3
Cognitive	Pretest	(1) 50-minute teacher-fronted instruction (2) 30 minutes of pairwork	(1) 50-minute instruction delivered via computer (2) Posttest
Speech Act	Pretest	(1) 40-minute teacher-fronted instruction (2) 40 minutes of pairwork	(1) 50-minute instruction delivered via computer (2) Posttest
Control	Pretest		Posttest

Pre- and posttests

Two tests were developed, Version A and Version B. The tests had a forced-choice, fill-in-the-blank format. The tests consisted of 40 short dialogs or paragraphs, each of which was missing a modal. Subjects were asked to choose the most appropriate modal from among four possible choices. The dialogs and paragraphs were constructed so that only one choice was appropriate. The tests were piloted with native speakers of English and adjusted until each paragraph received 100% agreement on the appropriate modal choice. For each of the tests, 20 items targeted a social (or root) meaning and 20 targeted a logical prediction (or epistemic) meaning. For each of the four target modals, four social and four logical prediction items were constructed; thus, eight items were constructed for each targeted modal for a total of 32 target items. An additional eight filler items were constructed which targeted uses of the modal *might*. Subjects' scores on the filler items in which *might* was the targeted answer were not used in calculating scores. Below are examples of the test items:

a. Logical prediction (Epistemic) — Appropriate answer is *must*.
Instructions: Circle the most appropriate modal verb within the context.
might, must, should, would

John: I can't believe he's 52! He doesn't look a day older than 20.
Tom: There's just no way a person that age can look like that without some special help. He _____ have had plastic surgery.

b. Social/real world (root) — Appropriate answer is *should.*
Instructions: Circle the most appropriate modal verb within the context.
could, must, should, would

A: I wonder why they haven't delivered the pizza. When did you order it?
B: About an hour ago.
A: That's strange. Usually they deliver in 30 minutes. It _____ be here by now! I wonder if the driver is having trouble finding the house.
B: Why don't you try calling them and see what's happening?

The tests were blocked so that half the subjects in each group received Version A as the pretest and half received Version B. Those who received Version A as the pretest received Version B as the post-test and vice versa. To determine whether the test forms were equivalent, the scores on the two tests were compared. A two-way ANCOVA with both Treatment and Test Form Order as between subject variables and pretest scores as covariate was conducted. Mean scores for the Test Form A pretest group, with scores adjusted to account for pretest results, was 21.9, whereas the mean for the Test Form B pretest group was 22.0. The ANCOVA indicated no significant different between the Test Form orders, and the eta squared value indicated that no variance was due to the test form order, $F(1,53) = .013$, $p = .909$, $\eta_p^2 = .000$. The results of comparing the two test versions are represented in Table 2:

Table 2. Descriptive Statistics Comparing the Two Modals Test Forms.

	N	*M*	*SD*	Range
Pretest Form A	27	20.5	3.5	12–27
Pretest Form B	27	21.6	3.4	13–27
Posttest Form A	27	22.1	3.7	12–29
Posttest Form B	27	22.9	4.3	13–32

In sum, the level of difficulty of Version A and Version B were highly comparable.

Cognitive treatment
One of the researchers led a 50 minute teacher-fronted, interactive explanation of a force dynamic and metaphoric extension interpretation of the modals. The researcher began by mentioning some of the modal verbs (e.g., *will, would, can, could, should*, and *must*) and the fact that most second language learners found modal verbs confusing because they were difficult to define and because many had more than one meaning. Next the researcher explained that the class would be looking at the modals from a perspective that involved defining the modals in terms of physical forces and metaphorical extensions from the physical/social world to the world of reasoning (or making logical predictions). After the brief introduction, the students were given a worksheet which represented the force dynamics associated with each modal in terms of the diagrams illustrated in Figure 1 and discussed in the previous section. Students were allowed to quickly look over the handout. Next, the researcher explained the conventions used in the diagrams, such as double outstretched arms indi-

cating more force than single outstretched arm and external force or authority being represented by a larger figure applying various amounts of pressure on the actor's back, as with *must* and *should*.

Also, the researcher discussed the HERE IS NOW-THERE IS THEN metaphor and the notion that humans are more sure of events and situations happening in the present moment than in the past because the events and situations in the present are perceptually verifiable. The solid lines indicated a present tense form and thus the stronger form of the modal.

Using the worksheet as a basis for discussion, the researcher led a discussion of each modal. A variety of techniques to engage the participants were used. For instance, when *will* was introduced, the researcher acted out forward motion with arms outstretched and discussed the noun *will*, as in phrases such as *'My own free will'* or *'She has a lot of will power.'* Throughout the teacher-fronted portion, participants were encouraged to provide their own examples and ask questions. The discussion lasted approximately 50 minutes.

The teacher-fronted instruction was followed by an interactive task in which the participants worked in pairs. The participants were given a worksheet with one model scenario with accompanying questions and two additional scenarios. The researcher led the class through the model scenario and the accompanying questions. The model scenario appears in Figure 2.

After modeling the interactive task, the researcher asked the participants to consider two additional scenarios with their partners and to write their responses to the questions on their worksheets. The participants were encouraged to refer to their handout with the diagrams and to use force dynamic interpretations of the modals as they discussed the examples. All the pairs finished discussing the two scenarios within the allotted 20 minutes. Two of the researchers circulated among the groups, engaging them in discussion and answering questions.

Example 1: *You **should** go to the doctor.*
In what context do you use **should?**
Context sentence is underlined.
Case A: <u>You've been coughing for two weeks</u>. You **should** go to the doctor.

Do you think **should** works for this context? Why or why not?

Answer: Yes, **should** works. By using **should**, the speaker (who is acting as the outside authority) is giving a strong suggestion. The speaker is very concerned about his friend's health since he has been sick for so long. **Should** also shows the speaker thinks the listener has some responsibility to follow the suggestion. Anyone who has had a bad cough for two weeks knows going to the doctor is a good idea. The speaker thinks that it is clearly in the listener's best interest to follow this suggestion.

Figure 2. Cognitive group: sample pair work exercise.

Four days later, the participants met in a computer lab and worked through a computer-delivered, self-instruction module which reviewed the force dynamic explanation of the modals, provided multiple examples of the uses of the modals *should, would, could*, and *must,* and which also presented eight example scenarios of each targeted modal (4 root uses; 4 epistemic uses). Each scenario was accompanied by three questions which focused on a CL-based explanation for the use of the modal. A sample scenario and a question illustrating the physical/social use of *must* appears in Figure 3.

All the participants finished the computer-delivered self-instruction within the allotted 50 minutes. Immediately after finishing the self-instruction, particpants completed the posttest.

Consider the forces at play in this use of **MUST**:

Rachel: *Our professor is very strict about meeting deadlines. He said he would not accept any late homework. That means I **must** get my homework in by 5pm today or not get any credit.*

Click on the source of the force shown by Rachel's use of **must:**

1. *Rachel's internal desire to do well in the course.*
2. *Rachel's respect for the professor and her internal acceptance of his authority.*
3. *Rachel's understanding of the professor's right to set strict deadlines and that she has no choice but to follow the rules if she wants to get credit for the homework.*

(Correct choice is 3).

Figure 3. Cognitive group: Self-instruction materials. Sample scenario and questions illustrating the physical/social use of *must*

Speech Act treatment

The lesson was taught by two of the researchers. It began with a short video clip from a popular U.S. sitcom. The two characters in the clip were discussing a small crafts business that character A was involved in. Character A knew very little about practical business matters, whereas B was a highly educated, but socially incompetent, math expert. A and B determined that A was losing money. B declared that he knew how to make the business viable. At this point, B began to leave.

(11) A: B, **could** you help me make this work?
B: Yes, of course, I **could.** (B again begins to leave.)
A: Wait B, **would** you help me?

The researchers led a discussion of the uses of *could* and *would* in the dialog. The key points are that the first use of *could* is technically ambiguous. The most likely interpretation is that A is requesting B's help. However, it is also possible to interpret this as a query about B's ability to help. B appears to be responding to the second, less likely interpretation. This emphasizes a rule found in most of the ELT materials that when a speaker makes a request for assistance using the form *could*, the appropriate affirmative response is to use *can*, not *could* (As in, *Yes, of course I can help.*). The second point was to contrast the meaning difference between B's use of *could* and A's use of *would.*

Next, the researchers distributed the 'Modal Verbs and their Functions' handout and led a discussion over the major speech act functions and the modals that are used to express those speech acts. The worksheet was based on the presentation of modal verbs found in 10 current ELT texts. The worksheet presented nine major speech acts functions expressed by modal verbs, along with each modal verb that was claimed to be used to express that speech act. The speech acts included: (1) expressing physical ability, (2) seeking and granting permission, (3) making a request, (4) giving advice, (5) giving a suggestion, (6) stating a preference, (7) expressing necessity and obligation, (8) discussing future possibility, and (9) making assumptions. Figure 4 provides examples for two functions, giving advice and making assumptions.

As with the Cognitive treatment group, the researchers used a variety of techniques to engage the students. For instance, when introducing 'making assumptions', two students were asked to step outside the room, close the door, and then one knocked on the door. The participants who remained in the room were asked how sure they were that student X was knocking on the door. When they indicated they were sure it was one of the two students who had just left the room even though they could not see who was knocking, but were not able to say with certainty which of the two was knocking, the researcher directed their attention to the making assumptions (or logical prediction)

Speech Act	Modal	Examples
Give advice	**should**	Anne seems to struggle with math and physics. She should get a good tutor.
	ought to	If you are having trouble making friends, you ought to spend more time with the rest of us.
	had better	Harry looks very tired. He'd better get some rest. The exam is tomorrow morning.
Make assumption	**may**	I have tried to call Mary several times but no one has answered. I may have the wrong number.
	might	She might be at the library. She always studies hard for her exams.
	could	I heard someone at the door. It could be my husband coming home from work.

Figure 4. Traditional group: Sample excerpt from worksheet, Modal verbs and their Speech Act functions *can, could, may, might, must, ought to, should, will, would*

use of *might and could*. The researchers asked individual participants to read the example sentences out loud and explain the meaning of the modal in terms of the strength of the speaker's attitude. The researchers were careful to actively engage the participants by acting out sample sentences and making sure that each participant made at least one oral contribution. Participants were also asked to volunteer additional examples of their own for each of the speech acts. This discussion lasted approximately 40 minutes. The group discussion was followed by three interactive tasks.

The three interactive tasks were developed to encourage the participants to consider the various speech acts that had been identified with modals verbs and to practice using the appropriate modal verb in context. The tasks included controlled construction of a dialog (followed by a suggested model dialog using appropriate modals); this task was done in pairs. The second task was a dialog in which 6 errors with modals occurred and where the participants were asked to identify the errors and change them to appropriate modal choices; this task was done in pairs. In the final task, participants were put in groups of four. This was an open-ended task in which the participants were given a current TV schedule and asked to come to a determination of which specific program to watch at a particular time. This task emphasized the speech acts of requesting, giving advice, giving suggestions, and stating a preference. Completion of each task was followed by a large group discussion of the groups' results. Across the three tasks, care was taken to balance the number of opportunities to use each of the nine speech acts and each of the modal verbs, so that participants had the opportunity to use each of the modal verbs listed on the handout at least once for each of the speech act functions identified on the worksheet. Participants were encouraged to consult the worksheet as they completed the tasks.

Four days later, the participants were given a 50 minute, computer-delivered lesson on modals. The instruction consisted of nine passages based on current ELT teaching materials. Each passage highlighted one of the nine speech acts presented on the first day's handout. Care was taken to include visuals such as cartoons and pictures to make the materials engaging. Each passage was introduced with a brief review of the targeted speech act. The review section of the self-instruction was followed by a set of exercises. The exercises were of two types: (1) a passage in which three modals were bolded, where the participants were asked to determine the speech act each modal was expressing; (2) a passage containing several errors with modals, where the participants were asked to identify the errors and supply the appropriate modal. The length of the Speech Act computer

delivered instruction was closely matched with that of the Cognitive computer delivered instruction. The Cognitive instruction involved more explanation of concepts, such as force dynamics and metaphorical extension. This was balanced by providing more examples of modals used in context in the Speech Act materials. All the participants completed the self-instruction module within the allotted 50 minutes. Immediately after completing the module, they took the posttest.

Results

To determine whether the cognitive treatment group ($N = 38$) outscored the speech act treatment group ($N = 16$) when the effect of prior knowledge was taken into account, an Analysis of Covariance (ANCOVA) was conducted using SPSS. The between-subjects independent variable of treatment type had two levels (cognitive and speech act). The dependent variable consisted of modal posttest scores. The covariate consisted of modal pretest scores.

The assumptions for ANCOVA were met. The pretest and posttest scores of each group had a normal distribution, and all tests for skewedness and kurtosis were nonsignificant. As required by ANCOVA, the covariate (pretest scores) was independent of the effects of the treatment. Moreover, a Levene's Test of Equality of Error Variances was nonsignficant ($p = .902$), showing that the assumption of homogeneity of variance had not been violated.

The adjusted means for the posttest (adjusted to account for pretest results) were 23.3 and 20.6 respectively for the Cognitive and Speech Act groups. The ANCOVA revealed a main effect for treatment type: $F(1,53) = 7.31$, $p = .000$, $\eta_p^2 = .125$. The confidence interval at $p = .05$, using a Bonferroni adjustment for multiple comparisons, was between 0.7 and 4.6 for the mean difference between the Cognitive and Speech Act group. The Cognitive group thus significantly outperformed the Speech Act group, with treatment type able to account for 12.5% of the between-subject variance. These results are represented on Table 3.

Table 3. Scores of three instruction type groups on the 32-item modal test

Instructional Type		**Pretest**		**Posttest**	
	N	***M* (*SD*)**	**Range**	***M* (*SD*)**	**Range**
Control	9	22.4 (2.1)	17–27	22.7 (3.5)	18–24
Speech Act	16	20.3 (3.4)	13–26	20.2 (4.4)	12–28
Cognitive	38	21.3 (3.5)	12–27	23.4* (3.5)	17–32

* Significant at $p < .001$

The gain scores for the groups are represented in Figure 5.

In sum, the results show that the Cognitive group improved in their use of the modals, while the Speech Act group showed no gain.

Discussion

The results of the statistical tests show that the Cognitive group experienced significant gains over the Speech Act group. It is important to note that the treatment effect was moderate (a 2.7-point gain). However, we argue the gain was considerable in light of the limited duration of the treatment. Both groups received approximately 2 hours of instruction on the modals. The Cognitive group had many new concepts to learn. For instance, they were asked to think about the modals in terms of force dynamics and consider the role of metaphor in structuring the grammatical system. These represent radically different ways of thinking about grammar. At the same time, they were asked to learn specific, new meanings for each of the modals presented and think about how the modals are

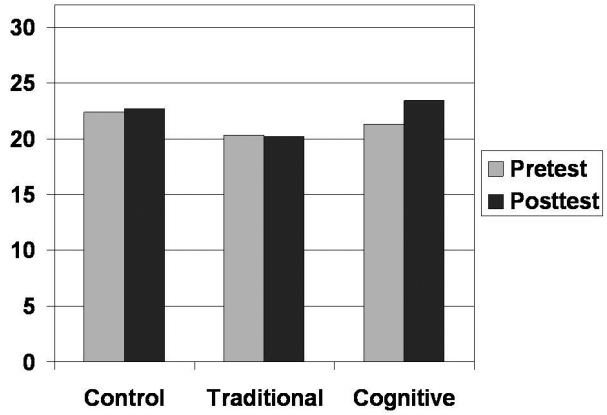


Figure 5. Modal pretest and posttest scores of three experimental groups.

used to make meaning in context. This represents a set of relatively heavy cognitive demands. In contrast, for the most part, the material presented to the Speech Act group was a review of an analysis they had been introduced to in the past. They were not asked to learn a new system for thinking about the modals; rather they were given many contextualized examples of the modals and a set of formal rules to guide their appropriate choice of the modals.

Although the approach to modals was not new, the treatment did allow considerable opportunity for the participants in the Speech Act group to learn (or memorize) contextualized uses of the modals that they had not yet mastered. In other words, the Speech Act group received considerable implicit input. During the teacher-fronted instruction, the researchers actively engaged the participants in the Speech Act group, encouraging them to consider how each of the modals functioned in context. The self-instruction component provided many contextualized uses of the target items. Thus, we feel that the gains demonstrated by the Cognitive group provide important support for the efficacy of using a CL approach to teaching the modals.

Nevertheless, some caveats must be issued. The target items in this study are not a full representation of the modal system. Several of the modals and periphrastic constructions were not addressed. Meaning shifts that occur when modals are negated or used in questions were also unaddressed. These are important, complicating aspects of the system. Tyler (2008) offers a fuller CL-based analysis of the modal system. An important direction for future research would be a longitudinal study which targets a fuller representation of the modal system.

Moreover, all the students had been introduced to the modals in previous classes. All of them knew a number of formulaic, speech act uses of the modals. In spite of our criticism of the speech act analysis, we must acknowledge that in order for students to gain full mastery of the modals, they are likely to need a great deal of contextualized exposure to how native speakers use the modals in order to perform various speech acts. This suggests that an approach that combines a CL approach with a contextualized speech act approach might be optimal. An important direction for future research would be a long-term study that uses such a combined approach.

Finally, the Cognitive treatment was presented by the lead researcher, who developed the analysis. The Speech Act treatment was presented by both the lead researcher and a second researcher, neither of who had been instrumental in developing the analysis. Although the researchers tried to present both approaches with enthusiasm and imagination, it is possible that the Cognitive group sensed more enthusiasm for the approach than did the Speech Act group.

Conclusion

We believe that L2 researchers and teachers would be well served by reassessing their (often implicit) assumptions about the nature of language and the traditional models of language that forms the basis of most L2 texts and grammars.

We further argue that Cognitive Linguistics, which represents a radical departure from the models found in current ELT textbooks, is a theoretical approach that offers important new insights into grammar and lexis. The focus of the present experimental work has been on the English modals, but there are many other areas of grammar that have been analyzed by cognitive linguists, yielding insights that the interested language teacher would find informative. A major challenge to applied cognitive linguists is to demonstrate to L2 researchers and teachers that Cognitive Linguistics is not only a more complete and accurate theoretical approach to language, but also one that is of particular benefit to L2 learners. Key to this endeavor is creating and testing language teaching materials that maintain the precision offered by the theoretical model, but that are also accessible to L2 teachers and learners. The experimental examination of effectiveness of using CL-based teaching materials for the modals represents a promising step in this process.

Notes

1. Within formal semantics, what we term root meaning is often referred to as deontic.

2. The speech act-based approach to modals found in the 10 current ELT textbooks we examined is sometimes also referred to as a Notional-Functional account. These texts did not strictly adhere to the taxonomies developed by Austin (1962) or later by Searle (1969). Rather these textbook authors developed their own unique taxonomies, using terms for speech acts such as (1) expressing physical ability, (2) seeking and granting permission, (3) making a request, (4) giving advice, (5) giving a suggestion, (6) stating a preference, (7) expressing necessity and obligation, (8) discussing future possibility, and (9) making assumptions. None of these texts discussed theoretical foundations for their analysis or presentation of language points. It is particularly important to note that our use of the term 'functional' does not refer to the broad set of research endeavors, such as Dik's functional model (1989) or Halliday's Functional Systemic Grammar. Indeed, several of these research endeavors have addressed English modals in far more sophisticated, systematic ways than found in the 'notional-functional' approaches used in typical ELT textbooks. However, since none of these analyses have been adopted into current ELT textbooks, consideration of their potential contribution to ELT pedagogy is beyond the scope of the present paper.

3. CL is best described as an approach to language, which shares a number of common assumptions, rather than a specific model of language. CL includes at least two versions of Cognitive Semantics (e.g. Lakoff 1987/1991; Talmy 2000), Cognitive Grammar (Langacker, 1987, 1991), Construction Grammar(s) (e.g., Goldberg 1995, 2006), and Blending Theory (Fauconnier & Turner 2002).

4. Other Cognitive Linguists, most notably Langacker (1991) and Nuyts (2001) have offered somewhat different accounts of English modals than those proposed by Sweetser (1990) and Talmy (1988; 2000). We chose to base our experimental materials on Sweetser (1990) because her account focuses on several basic tenets of CL (such as embodied meaning in the form of human understanding of force dynamics, metaphorical extension from the socio-physical to the more internal and abstract, and motivated polysemy) which we believe are particularly important for L2 practitioners and students to understand. The analyses offered by Langacker and Nuyts are more technically dense and less readily understandable by the non-expert. Their insights, such as Langacker's notion of subjectivity, may ultimately provide important additions to a presentation of the modals for L2 practitioners and learners. However, at this point, we felt attempting to incorporate these theoretical tenets into our presentation of the modals was beyond the scope of the current project.

5. The overview of modals presented in this paper represents a rudimentary outline of the system. There are additional modals, such as the so-called periphrastic modals, and a number of quirks having to do with

shifting meanings when modals are negated or used in questions which are not addressed. A review of all these properties represents a book length discussion.

6. It is possible to say something like *I must get my hair cut*. Following Sweetser's argument, this would indicate a subtle shift in the speaker's stance, perhaps indicating a sense of obligation to meet certain societal expectations about grooming.

7. Since their early work on CL, researchers like Langacker (1987), Lakoff (1987) and Talmy (2000) have conceptualized the semantics of verbs, prepositions, grammatical aspect and other linguistic elements in terms of spatial scenes. The use of diagrams to depict the meanings of linguistic forms is a well-established CL tradition.

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