Modality and Language

Modality is a category of linguistic meaning having to do with the expression of possibility and necessity. A modalized sentence locates an underlying or *prejacent* proposition in the space of possibilities (the term *prejacent* was introduced by medieval logicians). *Sandy might be home* says that there is a possibility that Sandy is home. *Sandy must be home* says that in all possibilities, Sandy is home. The counterpart of modality in the temporal domain should be called "temporality", but it is more common to talk of tense and aspect, the prototypical verbal expressions of temporality. Together, modality and temporality are at the heart of the property of "displacement" (one of Charles F. Hockett's design features of human language) that enables natural language to talk about affairs beyond the actual here and now.

There are numerous kinds of expression that have modal meanings, the following is just a subset of the variety one finds in English:

(1)   Modal auxiliaries
        Sandy must/should/might/may/could be home.

(2)   Semimodal Verbs
        Sandy has to/ought to/needs to be home.

(3)   Adverbs
        Perhaps, Sandy is home.

(4)   Nouns
        There is a slight possibility that Sandy is home.

(5)   Adjectives
        It is far from necessary that Sandy is home.

(6)   Conditionals
        If the light is on, Sandy is home.

It is traditional to use English modal auxiliaries or semimodal verbs as the primary source of illustrative examples. This is in spite of the fact that these elements have a rather curious set of grammatical properties. Indeed, it appears that modal meanings are part of a natural logical vocabulary and thus elements with modal meanings easily become part of the inventory of grammatical or functional morphemes, which are typically associated with idiosyncratic, nonproductive grammatical characteristics (for a cross-linguistic survey of this process, compare Bybee et al. 1994).

Kinds of Modal Meaning

One can distinguish different kinds of modal meaning. *Alethic* modality (Greek: *aletheia*, meaning 'truth'), sometimes *logical* or *metaphysical* modality, concerns what is possible or necessary in the widest sense. It is in fact hard to find convincing examples of alethic modality in natural language, and its inclusion in this list is primarily for reason of historical completeness. The following categories, however, are of primary importance in the study of natural language. *Epistemic* modality (Greek *episteme*, meaning 'knowledge') concerns what is possible or necessary given what is known and what the available evidence is. *Deontic* modality (Greek: *deon*, meaning 'duty') concerns what is possible, necessary, permissible, or obligatory, given a body of law or a set of moral principles or the like. *Bouletic* modality, sometimes *boulomaic* modality, concerns what is possible or necessary, given a person's desires. *Circumstantial* modality, sometimes *dynamic* modality, concerns what is possible or necessary, given a particular set of circumstances. *Teleological* modality (Greek *telos*, meaning 'goal') concerns what means are possible or necessary for achieving a particular goal. In the descriptive literature on modality, there is taxonomic exuberance far beyond these basic distinctions.

Flexibility of Meaning

Many modal expressions can be used to express many or all of these kinds of modal meaning. Witness the English semimodal *have to* in the following set of examples:

(7)   It has to be raining. [after observing people coming inside with wet umbrellas; epistemic modality]

(8)   Visitors have to leave by six pm. [hospital regulations; deontic]

(9)   You have to go to bed in ten minutes. [stern father; bouletic]

(10)   I have to sneeze. [given the current state of one's nose; circumstantial]

(11)   To get home in time, you have to take a taxi. [telelological]

Some modal expressions are more specialized in what kind of meanings they can carry. The English auxiliary *might* is most comfortable expressing epistemic modality.

(12)   It might be raining.

Some modals only occur in specialized environments. The modal *need* with a "bare infinitive" complement can only occur in negative environments:

(13)   a.   You need not worry.
       b.   *You need worry.

(14)   Nobody need worry.

Such "negative polarity" modals occur in other languages as well (compare the Dutch *hoeven* and the German *brauchen*).

Possible Worlds Semantics

In technical work on natural language semantics, modality is analyzed with the machinery of *possible worlds semantics*, developed by logicians for the artificial language of modal logic. The most influential incarnation of this idea is found in the work of the semanticist Angelika Kratzer (1981, 1991).

The starting tenet is that modal expressions express *quantification* over *possible worlds* – regardless of what those might be (most practitioners have few ontological scruples). Possibility modals correspond to existential quantification, while necessity modals correspond to universal quantification. Different kinds of modal meaning correspond to different choices of sets of possible worlds as the domain of quantification. These sets of possible worlds are assigned to the world in which the complex sentence is evaluated (the *evaluation world*) by an accessibility relation.

The accessibility relation underlying epistemic modality delivers as the domain of quantification those worlds that are compatible with what is known, with the available evidence in the evaluation world. Similary, deontic modality quantifies over worlds that satisfy the relevant body of law or principles. Bouletic modality quantifies over worlds that conform to what the relevant person desires. And so on, for the other kinds of modality.

Actually, Kratzer (1981, 1991) argues that modal meaning does not just rely on an accessibility relation but also on an ordering of the accessible worlds. The clearest argument for this complication of the semantics comes from deontic cases. Imagine a city whose traffic bylaws outlaw the practice of double parking at any time for any reason. The bylaws further specify that anyone who is found guilty of double parking must pay a considerable fine. Robin has been found guilty of double parking, so the following sentence seems to be true:

(15)   Robin must pay a fine.

Notice, however, that in all the worlds that conform to the traffic bylaws there never occurs any double parking, since that is against the law. Therefore, in none of those worlds does Robin pay a fine for double parking. Thus, the simple possible worlds analysis incorrectly predicts the sentence to be false.

Kratzer's (1981, 1991) analysis makes modal expressions doubly relative: they need to be interpreted relative to (i) a set of accessible worlds (*modal base*), and (ii) an ordering of those worlds. For the case in hand, the accessible worlds would be those where Robin's actions hitherto are what they are (double parking occurs) and that from then on develop in many conceivable ways. The ordering would be that induced by the traffic bylaws, which would favor among the accessible worlds those where Robin pays a fine. The truth-conditions of this example are then that in all of the favored worlds among the accessible worlds, Robin pays a fine. The sentence could be made false either if Robin did not in fact double park or if the traffic bylaws do not in fact require a fine.

The surface variety of modal meanings is thus a product of the interplay of three factors: (i) the quantificational strength (possibility, necessity, and shadings in between, e.g. *slight possibility*), (ii) the modal base, and (iii) the ordering source.

Epistemic modality has an epistemic modal base and either no ordering or an ordering based on plausibility or stereotypicality. Deontic modality has a circumstantial modal base (because one may have to abstract away from one's knowledge that the right thing will not be done) and an ordering source based on a body of law or principles. Bouletic modality again has a circumstantial modal base and an ordering source based on a relevant person's desires. And so on.

There is much detailed research remaining to be done on the fine distinctions between different modal expressions. Consider for example the fact that *ought to* and *have to* somehow differ in strength in their deontic use:

(16)   You ought to call your mother, but of course you don't have to.

Or, consider the fact (explored by Ninan 2005) that deontic *should* and deontic *must* differ as to whether one can admit that the right thing will not happen:

(17)   I should go to confession, but I'm not going to.

(18)   #I must go to confession, but I'm not going to.

There is also an interesting literature on fine details of epistemic meaning. Work by Ian Hacking (1967), Paul Teller (1972), and Keith DeRose (1991) has shown that there is much additional complexity and context-dependency behind the phrases "what is known" or "the available evidence", which are typically used to characterize epistemic accessibility. In particular, the context

may specify *whose* knowledge or evidence base is relevant to the claim made with an epistemically modalized sentence. Hacking, Teller, and DeRose, in various ways, concluded that epistemic modals are sensitive to what a relevant group containing the speaker knows. More recent work by MacFarlane (2003) and Egan et al. (2005) argues that epistemic modals are sensitive to what the *assessor* of the modal claim knows. This idea would connect epistemic modals to other kinds of statements that might be assessment-relative. But see von Fintel & Gillies (2005) for arguments against the assessment-relative semantics for epistemic modals.

Context-Dependency and Lexical Specialization

Kratzer (1981, 1991) argues that rather than treating the multitude of modal meanings as a case of (accidental) *polysemy*, it should be seen as the outcome of context-dependency. In other words, modal expressions have in of themselves a rather skeletal meaning and it is only in combination with the background context that they take on a particular shade of meaning (such as epistemic or deontic). She points to ways of making explicit what the intended conversational background is:

(19)   According to the hospital regulations, visitors have to leave by six pm.

(20)   Considering the evidence before us, it has to be raining.

In the absence of such explicit markers, natural language users need to rely on contextual clues and reasoning about each other's intentions to determine what kind of modal meaning a particular sentence is intended to express in its context of use.

As seen earlier, some modals are not entirely subject to the whims of context but impose their own preferences as to what kind of modal meaning they would like to express. English *might* likes to be epistemic (with some interesting exceptions, such as the use in *You might try to put the key into this slot*, which has the force of a suggestion). This kind of behavior is not uncommon for expressions that are context-dependent: pronouns refer to contextually furnished individuals but may include restrictions on what the context can furnish, for example, the gender marking on *she* requires that the context furnish a female individual.

It has been shown that there is a recurring historical development where a modal expression that initially has a nonepistemic meaning only (something that for opaque reasons is often called a "root modal") develops over time into an expression that also has epistemic meanings (e.g., Nordlinger & Traugott 1997 document this development for the case of English *ought to*).

The Argument Structure of Modals

So far, this entry has been presupposing that modality concerns the possibility or necessity of a prejacent proposition. There is, however, an ancient and persistent doctrine that another kind of modality concerns the possible or necessary existence of a relation between a subject or agent and a predicate. For example, one finds the claim that deontic modality can at least sometimes concern what an agent is permitted or obliged to do.

(21)   Sandy ought to call his mother.

The propositional analysis has it that the sentence expresses the necessity of the prejacent proposition that Sandy calls (will call) his mother, relative to the current circumstances and a body of ethics, for example. The predicate-level analysis has it that the sentence expresses that the agent Sandy and the property of calling his mother stand in a certain modal relation. Some authors have called this the *ought to be* versus *ought to do* distinction. Certain sentences are clearly cases of propositional-level *ought to be* modality:

(22)   There ought to be a law against double parking.

For sentences with an agentive subject, it is an open question, debated in the technical literature, whether a predicate-level or propositional-level analysis is correct. Whatever one's position in this debate is, one has to admit that some sentences with human subjects still do not express an obligation imposed on that subject:

(23)   Jimmy ought to go in his crib now. [said of a six-month-old baby]

Further and Related Categories

At the outset, this entry listed a set of expressions that have modal meanings. The list was far from complete. Here, some other types of expressions that may fall under the general category of modality or at least belong to adjacent categories will be added.

A closely related category, perhaps subsumable under modality, is *evidentiality*. Various languages regularly add markers, inflectional or otherwise, to sentences that indicate the nature of the evidence that the speaker has for the prejacent proposition. A typical evidential system might centrally distinguish between direct evidence and indirect evidence. The latter concept might be further subdivided into indirect reasoning from direct evidence or conclusions based on hearsay or the like. The standard European languages do not have elaborate

evidential systems but find other ways of expressing evidentiality when needed. The English adverb *apparently* seems to prefer indirect evidence:

(24)   Kim has apparently been offered a new job.

The German modal *sollen* has a hearsay interpretation:

(25)   Kim soll einen neuen Job angeboten bekommen haben.
         Kim soll a   new job offered   get   have
         "Kim has supposedly been offered a new job."

Another important category is *mood*, an inflectional marking on the main verb of a sentence, which expresses some kind of modal meaning. English has only a rudimentary mood system, if that. However, Romance languages, for example, productively use mood. In Italian, the complement clause of a verb like *say* occurs in the indicative mood, while the complement of *believe* appears in the subjunctive mood. There are attempts at analyzing the mood selection in such cases as depending on technical properties of the possible worlds semantics of the embedding verb. The research topic remains active and thriving.

Propositional attitude constructions are also related to modality. Consider the near equivalence of the following two sentences:

(26)   Robin suspects that the butler is guilty.

(27)   Given Robin's evidence, the butler might be guilty.

Jaako Hintikka (1969) proposed to analyze propositional attitudes with the same possible worlds machinery that was originally applied to modals, thus making the relation between the two categories explicit in their semantics.

Expressions of *illocutionary force* are also within or close to the field of modality. Consider in particular attenuating speech act markers, as explored in pioneering work by J.O. Urmson (1952):

(28)   The butler is, I suspect, guilty.

The difference between attenuated assertion of a proposition and categorical assertion of a modalized proposition is small, one suspects.

One particular kind of expression deserves attention: the modal particles that are rampant in some languages, such as German:

(29)   Kim hat ja einen neuen Job.
         Kim has JA a   new   job
         "Kim has a new job, as you may know already"

The gloss here is only very approximate, the meaning of the modal particles is very elusive and under active investigation.

Modality is a pervasive feature of natural language and sometimes it clearly appears in the semantics of an expression without a clear syntactic or morphological exponent. Such "hidden modality" can be detected for example in infinitival relatives in English (for extensive discussion, see Bhatt 2006):

(30)   When you have computer trouble, Sandy is the person to talk to. [≈ Sandy is the person one ought to talk to]

Sometimes the source for the modality can be identified but its etymology and nature remains opaque:

(31)   What Arlo is cooking has garlic in it.

(32)   Whatever Arlo is cooking has garlic in it. [epistemic modality triggered by -*ever*: speaker does not know what precisely Arlo is cooking]

The range of modal expressions is a rich domain for language-internal and cross-linguistic investigations.

Modality without Content?

So far, this entry has assumed that modalized sentences express complex propositions with a possible worlds-based quantificational meaning built on top of a prejacent unmodalized proposition. While this is indeed the standard analysis in formal natural language semantics, it is not the standard assumption in descriptive and typological linguistics.

The most common analysis in descriptive work treats modality as an expression of the speaker's attitude towards the prejacent proposition, rather than giving rise to a complex proposition with its own distinct content. The prevalence of this conception can perhaps be traced back to the influence of Immanuel Kant, who wrote in his *Critique of Pure Reason* that "the modality of judgments is a very special function thereof, which has the distinguishing feature that it does not contribute to the content of the judgment" (1781, p. 74). This idea seems to have influenced both practicing linguists and a subset of logicians, including Gottlob Frege, who wrote in his *Begriffsschrift* that "[b]y saying that a proposition is necessary I give a hint about the grounds for my judgment. But, since this does not affect the conceptual content of the judgment, the form of the apodictic judgment has no significance for us" (1879, p. 5).

It may be that scholars have typically adopted one of the two conceptions without much reflection. Within the descriptive literature, there is rarely any

argumentation for the speaker's comment analysis. And the formal semantic literature rarely addresses the issue either, basically ignoring the preponderance of the speaker's comment analysis in the descriptive literature.

One rather straightforward prediction of the speaker's comment analysis is that modalized sentences should not be easily embeddable. This prediction seems to be false for at least some standard modal expressions:

(33)   It might be that visitors have to leave by six pm. [epistemic modality embedding a deontic modality]

Such iterated modality is unexpected from the point of view of the speaker's comment analysis. Better cases for a comment analysis come from speech act markers:

(34)   #If yesterday, I suspect, was the worst day of the year, the market is in good shape.

The suspicion arises that some modal expressions have a comment-type meaning, while others contribute to the propositional content of the complex sentence. There is here, it seems, the opportunity for empirical and theoretical debate on this issue. It should be noted that the question here is related but not identical to the issue of whether a modal element expresses "subjective" or "objective" modality (these terms are discussed by Lyons 1977).

Independently of these ideas from descriptive linguistics, there are proposals that would give modals a meaning that goes beyond truth-conditions. In dynamic semantics, epistemic modals are treated as particular operations on an information state, see e.g. Veltman (1996). Finally, at least for deontic modals, it has been suggested that they can be used with performative force, whether or not they also have propositional content. Kamp (1973, 1978) and Lewis (1979) explore the idea that deontic *may* is used to grant permission, while Ninan (2005) explores the idea that deontic *must* is used to issue commands. It would be interesting to explore the notion that epistemic modals as well are used to carry out particular speech acts, again whether or not they also have propositional content.

Compositional Interactions

As the examples of iterated modality in the previous section showed, at least some, if not most, modal expressions can compositionally interact with other expressions. Interactions, with negation, quantifiers, and tense are particularly interesting.

The combination of modals with negation is a fountain of idiosyncratic facts. Consider that English *may* scopes under negation when read deontically, but scopes above negation when read epistemically:

(35)   He may not have any cake. [deontic, "not allowed"]

(36)   He may not be home. [epistemic, "possible that not"]

Or, consider that English *must* scopes above negation (in either reading) while German *müssen* scopes under negation:

(37)   a.   He must not have any cake. ["obligatory that not"]
        b.   He must not be home. ["evident that not"]

(38)   Er muss nicht zuhause bleiben.
        He must not   at-home remain
        "He doesn't have to stay home."

Lastly, note that while *can* does not easily allow an epistemic reading, negated *cannot* does have an epistemic reading:

(39)   a.   Sandy can be home. [?]
        b.   Sandy cannot be home. [epistemic]

Most of these facts have resisted systematic explanation and remain mysterious.

Sentences containing both modals and quantificational noun phrases are often ambiguous:

(40)   Most of our students must get outside funding . . .
        a.   for the department budget to work out.
        b.   the others have already been given university fellowships.

In some of the literature, this ambiguity is assimilated to the distinction between *de dicto* and *de re* interpretations, probably quite inappropriately. In any case, it has been observed that not all sentences show this ambiguity. For example, epistemic modals seem to resist having quantifiers scope over them (for an exploration, see von Fintel and Iatridou 2003):

(41)   Most of our students must be home by now.
        a.   must ≻ most of our students
        b.   *most of our students ≻ must

Again, this kind of fact remains mysterious, it may be an idiosyncratic syntactic fact without any grounding in semantics.

The interaction of modality and temporality is quite intricate and also quite ill understood. One should first note that the aspectual nature of the prejacent sentence has a strong influence on what kind of meaning a modal sentence can carry. A nonstative prejacent typically gives rise to deontic readings, while a stative prejacent is compatible with both epistemic and deontic readings:

(42)   He has to be in his office. [epistemic/deontic]

(43)   He has to see his doctor this afternoon. [nonepistemic]

While modal auxiliaries do not inflect for tense (the fact that *might* may be a past-tense inflected form of *may* has reasons in the mist of history), other expressions do allow such inflection.

(44)   He had to be in his office.

It is not always obvious whether what is happening here is that the modal sentence is located in the past or whether the modal has scope over a past tense prejacent. The preceding sentence, when read epistemically, is plausibly ambiguous, reporting a past deduction about a simultaneous state of affairs or a present deduction about a past state of affairs.

Finally, some modals in embedded positions seem not to express any modal meaning of their own but occur in "agreement" or "harmony" with a higher modal or mood. One relevant cases is *I am convinced that it must be raining.* See Portner (1997) for discussion.

Conditionals

An interaction of modals with other expressions that is of paramount importance is their appearance in conditional constructions. It has been noticed again and again that for sentences of the form *if p, modal q* it is hard to find a compositional interpretation that treats the *if*-construction as expressing some kind of conditional meaning, while the modal in the consequent expresses its usual modal meaning.

Consider, for example, the following conditional:

(45)   If Robin double parked her car, she must pay a fine.

A tempting idea is that the conditional construction introduces universal quantification over epistemically accessible worlds and says that the consequent is

true in all epistemically accessible worlds where Robin double parked her car. The consequent in turn is true in an evaluation world if in all worlds circumstantially accessible from that world and favored by the deontic ordering source, Robin pays a fine. However, now assume that one knows that Robin is invariably law abiding. She would never do anything that contravenes any law. So, among the epistemically accessible worlds there are none where she double parks against the law, so if she double parked, that must be consistent with the law. Hence, the above sentence would come out false. However, this seems wrong. The sentence does not make a claim about what the law must be like if Robin double parked her car. What it claims is that the actual law is such that double parking necessitates a fine.

The conclusion drawn from this and many parallel examples with other modal operators is that it is a mistake to analyze such structures as involving two layered operators: a conditional construction embedding or embedded in a modal construction. Rather, the idea has been to say that in such sentences, the *if*-clause does not supply its own operator meaning but serves as a "restriction" on the modal base of the modal operator. The proper analysis of the previous sentence is that it says that among those circumstantially accessible worlds where Robin double parked her car, the ones favored by the law as it is in the actual world are all worlds where Robin pays a fine.

After surveying a number of such cases, Kratzer summarizes the thesis as follows, "[T]he history of the conditional is the story of a syntactic mistake. There is no two-place *if . . . then* connective in the logical forms of natural languages. *If*-clauses are devices for restricting the domains of various operators" (Kratzer 1986).

What about "bare" conditionals such as *If Sandy's light is on, she is home*? Here there is no modal operator for the *if*-clause to restrict. Should one revert to treating *if* as an operator on its own? Kratzer (1986) proposes that one should not and that such cases involve covert modal operators – in this case, possibly a covert epistemic modal. This entry has nothing to say about that here.

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This entry has shown that the topic of modality is characterized by rich empirical detail, considerable cross-linguistic variation, and intriguing theoretical issues. The following bibliography can serve as a start for further reading and exploration.

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