Modality: A Standard Analysis

Ling 406/802; Spring 2005

Meaning and Grammar, Ch. 5.3.2; Kratzer 1991, pp. 63

Modality

- Modality has to do with necessity and possibility of situations.

- Grammatical means of expressing modality

Modal auxiliaries

   (1)   New structures **must/can** be generated.

Adjectives

   (2)   Winning the race is **impossible**.

Adverbs

   (3) **Possibly**, we will win the race.

Nouns

   (4)   Winning the race is a remote **possibility**.

Suffixes

   (5)   Such thoughts are express**ible** in any human language.

Simple present tense

   (6)   This car **goes** 200 miles an hour.

Ambiguity in Modal Expressions

- Epistemic

  (7) In view of what the available evidence is
  - a. Jockl must be the murderer.
  - b. Jockl may be the murderer.

- Deontic

  (8) In view of what the law provides
  - a. Jockl must go to jail.
  - b. Jockl may smoke in the building.

- Circumstantial

  (9) In view of the relevant circumstances
  - a. Jockl must sneeze.
  - b. Jockl can lift the rock.

$\Longrightarrow$ Modal expressions themselves are not ambiguous. Whether interpreted as deontic, epistemic or circumstantial depends on the **conversational background** provided by the context.

Applying the Semantics of □ and ◇ in IPC to Engl

- □ and ◇ in IPC are logical necessity and logical possibility.

  $[\![\Box\phi]\!]^{M,w,g}$ = 1 iff for all $w' \in W$ $[\![\phi]\!]^{M,w',g}$ = 1.

  $[\![\Diamond\phi]\!]^{M,w,g}$ = 1 iff there exists at least one $w' \in W$ such that |

  (10) 3 cannot be divided by zero.

  ¬◇[3 is divided by zero] = It is not the case that there is a $w \in$
  is divided by zero in w.

  (11) Two plus two must make four.

  □[two plus two makes four] = For all $w \in W$, two plus two ma

- All possible worlds are considered in evaluating logical necess
  possibility. But *must* and *can* in English do not always work th

  They sometimes form **contingent** modal statements, those w
  values depend on what the world of evaluation looks like.

Applying the Semantics of □ and ◇ in IPC to Engl (cont.)

- *Can* in English

  (12) Michael Jackson can't sing.

  ¬◇[mj sings] = There is no $w \in W$ such that MJ sings in w.

  This means that there is no logically possible world in which M clearly, one can conceive of a possible circumstance in which

- *Must* in English

  (13) Michael Jackson must go to jail.

  □[mj goes to jail] = For all $w \in W$, MJ goes to jail in w.

  This means that MJ goes to jail in all possible worlds. But clea conceive of a possible circumstance in which MJ doesn't go to

- Only a **relevant subset of possible worlds** are considered for these modal sentences, which is determined by the **conversa background** provided by the context.

Conversational Background

- *what the law provides, what we know, what is provided by the* etc.

- What the law provides in a particular possible world is a set of

  $[\![\text{what the law provides}]\!]^{M,w} = \{p_1, p_2, p_3, ...\}$

- What the law provides could be different from one possible wo

  $[\![\text{what the law provides}]\!]^{M}$ = a function f from a set of possibl of propositions.

  A conversational background in $w = f(w) = \{p_1, p_2, p_3, ...\}$

- A conversational background in w (= **modal base**) uniquely d relevant subset of possible worlds (= **accessible worlds**) to b for evaluating modal sentences in w.

  A proposition p is a set of possible worlds in which it is true.

  Accessible worlds = $\bigcap f(w) = \bigcap\{p_1, p_2, p_3, ...\}$

Meaning of Modals: *Must*

- Epistemic conversational background:

  [[Jockl must be the murderer]]^w = 1 in w iff it follows from wha
  that Jockl is the murderer.

  = 1 in w iff in all the worlds in which all the propositions that re
  we know in w are true, Jockl is the murderer.

- Deontic conversational background:

  [[Jockl must go to jail]]^w = 1 in w iff it follows from what the lav
  that Jockl goes to jail.

  = 1 in w iff in all the worlds in which all the propositions that re
  the law provides in w are true, Jockl goes to jail.

- Circumstantial conversational background:

  [[Jockl must sneeze]]^w = 1 in w iff it follows from what the the
  provides in w that Jockl sneezes.

  = 1 in w iff in all the worlds in which all the propositions that re
  the circumstance provides in w are true, Jockl sneezes.

Meaning of Modals: *May, Can*

- Epistemic conversational background:

  [[Jockl may be the murderer]]^w = 1 in w iff it is consistent from
  in w that Jockl is the murderer.

  = 1 in w iff in some world in which all the propositions that rep
  know in w are true, Jockl is the murderer.

- Deontic conversational background:

  [[Jockl may smoke in the building]]^w = 1 in w iff it is consistent
  law provides in w that Jockl smokes in the building.

  = 1 in w iff in some world in which all the propositions that rep
  law provides in w are true, Jockl smokes in the building.

- Circumstantial conversational background:

  [[Jockl may sneeze]]^w = 1 in w iff it is consistent with what the
  circumstance provides in w that Jockl sneezes.

  = 1 in w iff in some world in which all the propositions that rep
  circumstance provides in w are true, Jockl sneezes.

Meaning of Modals: More Formally

- $[\![\text{must } \phi]\!]^w = 1$ iff for all $w' \in \bigcap f(w)$, $[\![\phi]\!]^{w'} = 1$

  $= 1$ iff $\bigcap f(w) \subseteq \{w' : [\![\phi]\!]^{w'} = 1\}$

- $[\![\text{can } \phi]\!]^w = 1$ iff there is a $w' \in \bigcap f(w)$, $[\![\phi]\!]^{w'} = 1$.

  $= 1$ iff $\bigcap f(w) \cap \{w' : [\![\phi]\!]^{w'} = 1\} \neq \emptyset$

- Meaning of *must* and *can* are related to each other in a certai

  – must ϕ = neg can [neg ϕ]

  (14)   a.   We must rehearse for the play.
           b.   We cannot not rehearse for the play.

  (Cf. $\forall x P(x) = \neg \exists x \neg P(x)$, $\Box \phi = \neg \Diamond \neg \phi$)

  – can ϕ = neg must [neg ϕ]

  (15)   a.   We can rehearse for the play.
           b.   It's not the case that we must not rehearse for th

  (Cf. $\exists x P(x) = \neg \forall x \neg P(x)$, $\Diamond \phi = \neg \Box \neg \phi$)

What has the Standard Analysis Accomplish

- Captures the apparent ambiguity of modal expressions

- Accounts for the contingency of modal statements

- Captures the duality of *must* and *can*

QUESTION: As we have seen before, English modals also expres
possibility and logical necessity. Within the standard analysis, how
characterize the conversational background of modals that expres
possibility or logical necessity?

(16)   a.   3 cannot be divided by zero.
       b.   Two plus two must make four.

Shortcomings: Inconsistencies

- Judgments in an imaginary country

  Source of law in this imaginary country is the judgments made
  which are handed down.

  Every judge agrees that murder is a crime.

  Judges disagree on certain issues.

  Judge A decided that owners of goats are liable for damage th
  inflict on flowers and vegetables.

  Judge B decided that owners of goats are not liable for damag
  inflict on flowers and vegetables.

- Conversational background based on *what the judgments pro*

  {Murder is a crime, Owners of goats are liable for damage the
  inflict on flowers and vegetables, Owners of goats are not liab
  their animals inflict on flowers and vegetables}

- Predictions made by the standard analysis on necessity moda

   (17)   In view of what the judgments provide
         a.   Murder is necessarily a crime.
         b.   Murder is necessarily not a crime.

   Wrongly predicts that both examples in (17) are true. Accordin
   intuition, only (17a) should come out to be true.

- Predictions made by the standard analysis on possibility moda

   (18)   In view of what the judgments provide
         a.   Owners of goats are possibly liable for damage cau
               animals.
         b.   Owners of goats are possibly not liable for damage
               animals.

   Wrongly predicts that both examples in (18) are false. Accordi
   intuition, both should come to be true.

Shortcomings: Samaritan Paradox in Conditi

- A conversational background based on *what the law provides*

  {No murder occurs, If a murder occurs, the murderer will go t

- Predictions made by the standard analysis of modality and co

  (19)   It is necessary that
  - a.   if a murder occurs, the murderer will go to jail.
  - b.   if a murder occurs, the murderer will be knighted.
  - c.   if a murder occurs, the murderer will be given $100.
  - d.   if a murder occurs, the murderer will be fined $100.

  Any old conditional whose antecedent is the proposition *a mu
  comes out to be true!

Shortcomings: Graded Notions of Modali

- Modal expressions are gradable. But the standard analysis ca
  the notion of graded modality.

  (20)   a. Michl is probably the murderer.
         b. There is a good possibility that Michl is the murdere
         c. Michl might be the murderer.
         d. There is a slight possibility that Michl is the murdere

  In the standard analysis, there is no difference in truth conditic
  examples in (20).