

Unit 3: The Modal Operator Analysis for Imperatives

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ESSLLI 2008: 'Optimizing the Future - Imperatives between Form and Function'

3 Modality in Possible Worlds Semantics

- framework: developed and improved by Lewis, Kratzer, van Fraassen, von Stechow, van Rooy, von Fintel and many others

reason: has been used in detailed studies of modality in natural language

3.1 Simple (impersonal) modality

- Kratzer (1978), etc.: most modal expressions are context dependent:

- (1) a. Cécile **kann** in Rüsselsheim sein.
C. may in R. be.
'Cécile may be in Rüsselsheim.' *given what we know*
- b. Melli kann **heute** daheim arbeiten.
M. can today at.home work
'Melli can work at home today' *given what her boss says*
- (2) a. Cécile **muss** in Rüsselsheim sein.
C. must in R. be.
'Cécile must be in Rüsselsheim.' *given what we know*
- b. Melli **muss** heute daheim arbeiten.
M. must today at.home work
'Melli must work at home today' *given what her boss says*

wide range (cf. von Stechow 2004):

- a. epistemic: what I know, what we know, what Ede knows, ...
- b. circumstantial: the relevant facts, ...
- c. dispositional: Joost's dispositions, the program code of Emacs, ...
- d. physical: the laws of nature, ...
- e. deontic: what the law says, god's will, ...
- f. doxastic: what I believe, what people say, what Rick believes, ...
- g. teleological: our tasks, ...
- h. buletic: what I want, what Elena wants, ...
- i. stereotypical: the normal course of events, ...

some modal expressions are picky, e.g.:

– only epistemic

(3) He might be there.

– only circumstantial:

(4) Das ist machbar.
that is doable
'It's doable.'

– *dürfen*: only denotic, volitional or teleological background:

- (5) a. Du darfst dir einen Apfel nehmen.
you may take an apple! (PERMISSION)
b. Du darfst mich nicht allein lassen.
You cannot leave me alone.
c. Wenn du rechtzeitig kommen willst, darfst du nicht erst eine Viertelstunde vorher losfahren.
If you want to be on time you can't just leave a quarter before it starts.
d. *John darf in der Mensa sein.
John might be in the university cafeteria.

subjunctive *dürfte*: only weak epistemic possibility (unless occurring in a conditional)

(6) John dürfte in der Mensa sein.
John might be in the university cafeteria.

– subjective vs. objective possibilities: impersonal constructions vs. adverbials

- (7) a. Es ist wahrscheinlich, daß das Schiff sinkt.
EXPL is probable that the ship sinks
'It is probable that the ship will sink.'
b. Das Schiff wird wahrscheinlich sinken.
the ship will probably sink
'The ship will probably sink.'

• solution (to be refined): context dependent element

– compare pronouns like *he* -index (variable) indicates what the pronoun is supposed to (co)refer to, plus presupposition: male
context c determines a variable assignment s which interprets free variables

(8) $[[he_i]]^c = s(i)$ if $s(i)$ is male, else undefined.

– modal expressions combine with a parameter f which is a "pronoun" for a background (the **modal base**)

this modal base parameter f assigns to each world w a set of propositions; depending on how f is interpreted in the particular context (just like *he*), this can

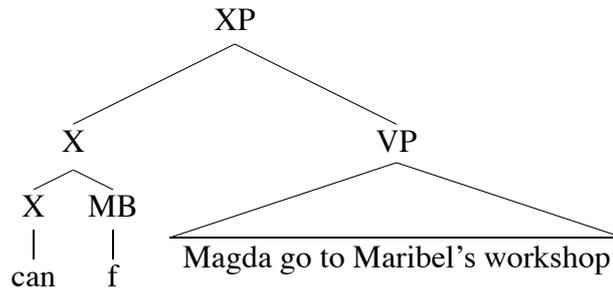
be the set of all propositions that, at w , are known to the speaker (*speaker epistemic*), or the set of all propositions that, at w are relevant facts (*circumstantial*), etc.

(9) $[[f]]^c = s(f)$ (= henceforth, in italics: f), a function of type $\langle s, \langle st, t \rangle \rangle$

- (10) a. $[[\text{must}]] = \lambda f \lambda p \lambda w. (\forall v \in \cap f(w)) [v \in p]$
 b. $[[\text{can}]] = \lambda f \lambda p \lambda w. (\exists v \in \cap f(w)) [v \in p]$

simple example (for syntactic assumptions, cf. von Stechow 2004), modal base is circumstantial *with respect to the relevant circumstances*:

- (11) a. Magda can go to Maribel's workshop.
 b.



- c. $[[[[\text{can } f] [\text{Magda go to Maribel's workshop}]]]]^c(w) = 1$ iff $\exists w' \in \cap f(w) : \text{Magda goes to Maribel's workshop in } w'$, where $f (= s(f)) = \textit{what the relevant circumstances are}$.

This is true if e.g. $f(w) = \{p, p \vee q, r\}$,
 $p = \lambda w. \text{Magda's handouts are finished in } w$.
 $q = \lambda w. \text{Magda works in the afternoon in } w$.
 $r = \lambda w. \text{Maribel's workshop is in the afternoon in } w$.

3.2 Graded Modality

- nice, but not good enough for inconsistent information, graded necessity/possibility, and practical inferences
- example: practical inferences

- (12) In w , all you want is a fee waiver for ESSLLI 2009.
 In w , you get a fee waiver only if you submit a course.
Therefore: Given the relevant circumstances and your wishes, in w it is necessary that you submit a lecture proposal for ESSLLI 2009.

modal base seems to have two components:

bouletic, *what you want* (f_1); circumstantial, *what the relevant circumstances are* (f_2)

$f_1(w) = \{\lambda v. \text{you obtain a fee waiver for ESSLLI 2009 in } v\}$,

$f_2(w) = \{\lambda v. \text{you submit a course in } v \text{ or you don't get a fee waiver in } v\}$

$f_1(w) \cup f_2(w) = \{\lambda v. \text{you obtain a fee waiver for ESSLLI 2009 in } v, \lambda v. \text{you submit a course in } v \text{ or you don't get a fee waiver in } v\}$

$\bigcap(f_1(w) \cup f_2(w)) \subseteq \{v \in W \mid \text{you submit a course for ESSLLI 2009 in } v\}$

- assume, in addition to the premises in (12), you're also lazy...

(13) In u , you want is a fee waiver for ESSLLI 2009.

In u , you don't want to work too much (course proposals! - *yikes*)

In u , you get a fee waiver only if you submit a course proposal.

Therefore: ...?

modal base (bouletic information, f_1 + circumstantial information, f_2):

$f_1(u) = \{\lambda v. \text{you obtain a fee waiver for ESSLLI 2009 in } v, \lambda v. \text{you don't submit a proposal in } v\}$

$f_2(u) = \{\lambda v. \text{you submit a course in } v \text{ or you don't get a fee waiver in } v\}$

$f_1(u) \cup f_2(u) = \{\lambda v. \text{you obtain a fee waiver for ESSLLI 2009 in } v, \lambda v. \text{you don't submit a course in } v, \lambda v. \text{you submit a course in } v \text{ or you don't get a fee waiver in } v\}$

$\bigcap(f_1(u) \cup f_2(u)) = \emptyset$

(14) Considering the relevant circumstances and what I want,

a. I must kill someone.

b. I must drink a lot of Alsterbräu.

c. It is necessary that I submit a proposal for ESSLLI 2009.

d. I can submit a proposal for ESSLLI 2009.

e. It is possible that I don't submit a proposal for ESSLLI 2009.

set of best worlds is empty - all necessity statements are trivially true, all possibility statements are false - :(!

- way out: distinguish between facts (**modal base** f) and preferences (**ordering source** g) (both: conversational backgrounds, $\langle s, \langle st, t \rangle \rangle$)

among the worlds you fetched (by modal base f), only look at the best ones according to the ordering source g

(15) ordering relation $\leq_{g(w)}$:

$\forall v, z \in W : v \leq_{g(w)} z$ iff

$\{p : p \in g(w) \ \& \ z \in p\} \subseteq \{p : p \in g(w) \ \& \ v \in p\}$

(16) $O(f, g, w) = \{v \in \bigcap f(w) \mid \forall z \in \bigcap f(w) : \text{if } z \leq_{g(w)} v \text{ then } v \leq_{g(w)} z\}$

side remark: I exclude neurotic cases of infinite approximation (cf. Kratzer 1991 for a definition of that can deal with it):

(17) The Limit Assumption (cf. Lewis 1973, p.19ff)

$\forall f, g, w : \bigcap f(w) \neq \emptyset \rightarrow O(f, g, w) \neq \emptyset$.

- (18) a. $[[\text{must}]]^c = \lambda f \lambda g \lambda p \lambda w. (\forall v \in O(f, g, w))[v \in p]$
 b. $[[\text{can}]]^c = \lambda f \lambda g \lambda p \lambda w. (\exists v \in O(f, g, w))[v \in p]$
- (19) Considering the relevant circumstances and what you want,
- a. $[[\text{You must kill someone.}]]^c(u) = 1$ iff
 $(\forall w' \in O(f, g, u))[\text{you kill someone at } w']$.
- b. $[[\text{You must submit a course proposal for ESSLLI 2009.}]]^c(u) = 1$ iff
 $(\forall w' \in O(f, g, u))[\text{you submit a course at } w']$.
- c. $[[\text{It is necessary that you don't submit a course proposal for ESSLLI 2009.}]]^c(u) = 1$ iff
 $(\forall w' \in O(f, g, u))[\text{you don't submit a course at } w']$.
- d. $[[\text{You can submit a proposal for ESSLLI 2009.}]]^c(u) = 1$ iff
 $(\exists w' \in O(f, g, u))[\text{you submit a course at } w']$.
- e. $[[\text{It is possible that you don't submit a course proposal to ESSLLI 2009.}]]^c(u) = 1$ iff
 $(\exists w' \in O(f, g, u))[\text{you don't submit a course at } w']$.

if the ordering source is empty, simple and graded necessity/possibility collapse

4 Imperatives as Graded Modals

- somewhere in their syntactic structure, imperatives contain a modal operator OP_{Imp} (for the moment, we ignore tense, aspect, and the subject)

(20) $[[OP_{imp}]]^c = \lambda f \lambda g \lambda p \lambda w. (\forall w' \in O(f, g, w))[p(w')]$
(treatment of modal base f will be refined)

- deriving the interpretations:

- (21) a. Get up! ORDER, *single occasion*
Given what I order, it is necessary that you get up (now).
- b. Be nice to your grandmother! ORDER, *long term*
Given what I order, it is necessary that you are (always) nice to your grandmother
- c. Stay away from cigarettes! ORDER, *long term*
Given what I order you to do, it is necessary that you stay away from cigarettes
- (22) Don't budge an inch! PROHIBITION, *single occasion*
Given what I order you to do, it is necessary that you don't budge an inch.
- (23) Have fun! WISH
Given what my wishes are, it is necessary that you have fun.
- (24) Please, don't have broken another vase! WISH, *past*
Given what my wishes are, it is necessary that you are not in the post state of having broken another vase

speaker-disinterested imperatives (WARNING, ADVICE)

(25) Run (...there's an avalanche approaching)! WARNING
Given what your goals are, it is necessary that you run.

(26) A: How do I get to Rüsselsheim tonight? ADVICE
 B: Take the S8, it's more regular than the S9.
Given what you goals are, it is necessary that you take the S8.

- find out: what do the *given...*-parts have in common? what distinguishes them from e.g.

(27) a. You must have had too many cocktails at the ESSLLI party.
 b. *Given what I infer from your facial expression*, you must have had too many cocktails at the ESSLLI party.
 c. #Have had too many cocktails at the ESSLLI party.

(28) a. You'll get soaked on your way home!
 b. *Given what I take to be most plausible*, it is necessary that you'll get soaked on your way home.
 c. Get soaked on your way home!

(29) a. You have to remove your car. But I don't care if you do it.
 b. *Given what the regulations of this hotel say*, it is necessary that you remove your car.
 c. Remove your car! (#But I don't care if you do it.)

- modal base: imperatives take into account what are taken to be possible continuations with respect to the (relevant) known facts (Common Ground) - 'optimizing the future'
assumption: the modal base is always (a subset of) the Common Ground (*given what we know the world/our situation to be like*)

(30) $[[OP_{imp}]]^c = \lambda f \lambda g \lambda p \lambda w. (\forall w' \in O(cg_F, g, w)) [p(w')]$,
 where cg_F describes the Common Ground of c .

cg_F is short for $F(c)$, where $F : C \rightarrow (W \rightarrow pow(pow(W)))$, s.t.
 $(\forall c \in C)(\forall w \in W)[F(c)(w) = \{CG(c)\}]$

g : some *ideal* the future is to conform to (= ordering source), e.g. *what I the speaker want, what your goals are, what general goals are,...*

ORDER: (for the moment: $[[IMPPRO]]^c = c_A$)

(31) $[[[[OP_{Imp} f g] [IMPPRO \text{ get up }]]]]^c =$
 $\lambda w. (\forall w' \in O(cg_F, g, w)) [c_A \text{ gets up in } w']$,
 where $g = \{\text{what the speaker orders at } w\}$

effect on the discourse:

- modal base: no information gained:
 $(\forall c \in C)(\forall w \in CG(c))[cg_F(w) = CG(c)]$
 \Rightarrow new information is about what propositions are picked out by the contextually given ordering source g
- imperative (31) eliminates from the $CG(c)$ all worlds w , s.t. *what the speaker orders in w* assigns a set of propositions that picks out as best worlds in $CG(c)$ worlds where the addressee does not get up

- if c assigns a different value to g :

$$(32) \quad \llbracket [OP_{Imp} f g] [IMPPRO \text{ have fun at the party}] \rrbracket^c = \text{WISH}$$

$$\lambda w. (\forall w' \in O(cg_F, g, w))[c_A \text{ has fun at the party in } w'],$$

$$g = \{\text{what the speaker wishes at } w\}$$

\Rightarrow we learn something about the speaker's wishes

- internal make-up of the complement proposition does not matter (*add tense and aspect*)

- (33) a. Kiss her before every meeting.
 b. Stay away from cigarettes.

$$(34) \quad \llbracket [[OP_{Imp} f g] [not [IMPPRO \text{ move}]]] \rrbracket^c = \text{PROHIBITION}$$

$$\lambda w. (\forall w' \in O(cg_F, g, w))[c_A \text{ gets up in } w'],$$

$$\text{where } g = \{\text{what the speaker orders at } w\}$$

PROHIBITION: apart from syntactic restrictions, there can also be semantic restrictions on negation that are sensitive to conversational backgrounds, not to differences in clause types:

Korean: negation by *an* (NEG) vs. *mal* (IRNEG) (cf. unit 1) depends on deontic vs. non-deontic ordering source (cf. Pak, Portner, and Zanuttini 2004 for data, their (15a,b), and discussion of maybe even more fine-grained distinctions):

- (35) a. Nayil phati-ey ka-ci **mal**-ayakeyss-ta
 tomorrow party-to go-NMLZ IRNEG-should-DEC
 'I should not go to the party tomorrow.'
 b. Nayil phati-ey ka-ci **mal**-kkayo?
 Tomorrow party-to go-NMLZ IRNEG-INT
 'Should I go to the party tomorrow?'

- ADVICE requires an addition to the modal base:

(36) *A asks an official B:*
 How do I get to the fair? ADVICE
 B: Take the U4.
Given your goal of getting to the fair, given your wishes, it is necessary that you take the U4.

- teleological modality (cf. also anankastic conditionals, von Fintel and Iatridou 2005): add a designated goal to the modal base (should not be overwritten by other preferences, etc.) - here: temporarily added to $CG(c)$
on all worlds w in $CG(c)$: $g(w) = \{c_A \text{ goes to the fair, } c_A \text{ doesn't spend too much money, } c_A \text{ gets there in a reasonable amount of time, } c_A \text{ has a pleasant journey}\}$
- c_A knows what his goals are, and he normally knows what his wishes are
new information comes in as an addition to the modal base (inviolable):

(37) *Given what your goal is, given what the facts are about public transportation in Frankfurt, and given what your wishes are, it is necessary that you take the U4.*

f can bring in an additional body of information:

(38) $[[OP_{imp}]] = \lambda f \lambda g \lambda p \lambda w. (\forall w' \in O(cg_F \cup f, g, w)) [p(w')]$,
where $(f \cup f')(w) = (f(w) \cup f'(w))$.

- constraining contextual values for f and g :

recall: modal elements can be picky with respect to what ordering sources and modal bases they accept/other effects...

- German *sollen* and *müssen* in that only the latter can have an empty ordering source - in other words: *müssen* but not *sollen* can express impersonal deontic modality

(39) a. Sie müssen 500 Euro zahlen.
you.2PFORM must 500 euros pay
'You have to pay 500 Euros.'

b. Sie sollen 500 Euro zahlen.
you.2PFORM shall 500 euros pay
'(according to their rules) you shall pay 500 Euros.'

- similarly, we have seen that imperatives require non-empty ordering sources, hence the cannot be used for impersonal deontic necessity (a judge announcing a verdict could well use (40a), but not (40b)):

(40) a. Sie müssen 500 Euro zahlen.
you.2PFORM must 500 euros pay.INF
'You have to pay 500 Euros.'

b. Zahlen Sie 500 Euro.
pay.IMP.FORM you.2PFORM 500 euros
'Pay 500 Euros!'

- goal: let's restrict imperatives to those cases in which modal verbs would be used performatively

(41) a. A: Ask Melli about it!
B: #That's true./#That's not true!

- b. A: It is my wish that you ask Melli about it.
B: That's true./That's not true.

performative usages of modal verbs: equally weird, but: we can always coerce them into a non-performative reading

- (42) a. A: You have to go now. - B: #That's not true, I don't./or, A is reinterpreted
b. A: I hereby promise you to leave. - B: #That's not true, you don't.

- modals that are resistant against a descriptive reinterpretation: subjunctive of *sollen* (ignore independent PAST reading)

- (43) a. A: Du solltest jetzt Melli anrufen!
you should now melli call.INF
'Now, you should call Melli.'
b. B: #Das ist nicht wahr.
that is not true
#‘That's not true.’

Ninan (2005) suggests the same for English *must*; for performative modal expressions, he observes incompatibility with a follow-up negation of the prejacent (= the propositional argument of the modal) (his (4),(11)):

- (44) a. #Sam must go to confession, but he's not going to.
b. #Go to confession! #But you are not going to.

despite its resistance against negation, *solltest* doesn't show incompatibility with prejacent-negation; a counterfactual interpretation saves (45) from ungrammaticality:

- (45) Du solltest jetzt Melli anrufen. Aber du wirst es nicht machen.
you should now Melli call. but you will it not do
'You should call Melli now. But you won't.'

try another test for performativity: blocking free choice disjunction by *I forgot which*:

- (i) #You must clean the bathroom, or you must do the shopping, but I forgot which.
(ii) #Du solltest das Badezimmer putzen, oder du solltest einkaufen gehen, aber ich hab vergessen, welches von den beiden.

only: PAST, - according to what he said yesterday, you are under an obligation to
to checked: A: *You must go now.* B: *That's not true.*

- how can we constrain possible values for modal base and ordering source? - note that we have introduced them as pronouns (free variables in the syntax); values of pronouns in general are constrained by presuppositions

(46) $[[he_i]]^c = s(i)$ if $s(i)$ is male, else undefined.

what exactly are the conditions on modal base and ordering source in imperatives?

1. social or rational authority: modelled as perfect knowledge (cf. Groenendijk and Stokhof 1984, exhaustive knowledge)

(47) (*ignoring temporality*)

- a. y is an Authority on a property P :
 $(\forall w \in Bel(y)(c_w))(\forall x)[w \in P(x) \leftrightarrow c_w \in P(x)]$
- b. Authoritative Conversational Backgrounds of x in c :
 x is an authority on a conversational background f in c iff
 $(\forall w \in Bel(x)(c_w))(\forall p)[p \in f(w) \leftrightarrow p \in f(c_w)]$
- c. $AUTH(x)(c) = \{f : W \rightarrow pow(pow(W)) \mid$
 $(\forall w \in Bel(x)(c_w))[(\forall p)[p \in f(w) \leftrightarrow p \in f(c_w)]]\}$

modification (47')

- a. y is an Authority on a property P :
 $(\forall w \in CG(c))(\forall w' \in Bel(y)(w))(\forall x)[w' \in P(x) \leftrightarrow w \in P(x)]$
- b. Authoritative Conversational Backgrounds of x in c :
 x is an authority on a conversational background f in c iff
 $(\forall w \in CG(c))(\forall w' \in Bel(x)(w))(\forall p)[p \in f(w') \leftrightarrow p \in f(w)]$
- c. $AUTH(x)(c) = \{f : W \rightarrow pow(pow(W)) \mid$
 $(\forall w \in CG(c))(\forall w' \in Bel(x)(w))[(\forall p)[p \in f(w') \leftrightarrow p \in f(w)]]\}$

end of modification

speaker issues a necessity that depends only on parameters he is presupposed to be an authority on; truth of an imperative is trivial; falsity violates a presupposition

can be filtered by conditional antecedents:

- (48)
- a. Wenn ich hier noch etwas zu sagen habe, ruf ihn an.
 if I here still something to say have, call.IMPSG him PRT
 'If I am still in a position to say something, call him.'
 - b. Wenn ich dir etwas raten darf, komm nicht noch mal zu spät.
 if I you something give-advice.INF may, come.IMPSG not again
 QPRT too late
 'If I may give you a piece of advice, don't be late another time.'

- (49) The Authority Condition as a presupposition on OP_{Imp} :
 $[[OP_{Imp}]] = \lambda f \lambda g \lambda P \lambda w. (\forall w' \in O(cg_F \cup f, g, w))[P(w')]$,
 defined only for $f, g \in AUTH(x)(c)$

2. ordering source has to be a of a particular type: deontic, bouletic, teleological -

preference related; Portner 2007: **priority backgrounds** (vs. epistemic, doxastic, dynamic (= ability)) - preference related; rules out:

- (50) a. Be home at 5!
 b. Those alternatives that are *most plausible according to what I take to be the usual course of events*, are such that you are at home at 5.

- (51) Ordering Source-Restriction
 $[[OP_{Imp}]^c = \lambda f \lambda g \lambda p \lambda w. (\forall w' \in O(cg_F \cup f, g, w))[p(w')]$,
 is defined only if g is a preference related conversational background.

3. in contrast to modals that can be used descriptively, imperatives are infelicitous if the proposition is known to come true/hold impossible

- (52) a. Ich weiß, daß du das auf jeden Fall tun wirst, und du
 I know that you that in any case do.INF will, and you
 sollst es auch tun.
 should it too do.INF
 ‘I know that you are at any rate going to do this, and you should do it.’
 b. #Ich weiß, daß du das auf jeden Fall tun wirst, also
 I know that you that in any case do.INF will, so
 tu’s auch.
 do.IMP-it too
 #‘I know that you are at any way going to do this, so do it also.’

- (53) Epistemic Uncertainty Constraint (EUC) on imperatives:
 $[[OP_{Imp}] = \lambda f \lambda g \lambda p \lambda w. (\forall w' \in O(cg_F \cup f, g, w))[p(w')]$,
 is defined only if
 $CG(c) \subseteq$
 $\lambda w. (\exists w' \in Bel_{c_S}(w))(\exists w'' \in Bel_{c_S}(w))[\neg p(w') \ \& \ p(w'')]$
 (= the speaker is taken to believe that both $\neg p$ and p are possible).

4. to ensure the performative effect:

- (54) Get yourself an ice cream! #But I don’t want you to take one.
Given what your wishes are, it is necessary that you take an ice-cream.
- (55) a. #Call Melli! #But I don’t think it’s a good idea!
Given what your wishes are, it is necessary that you call Melli.
 b. Okay, then go ahead and call her! But I don’t think it’s a good idea!
 CONCESSION
- (56) Ordering source affirmation-principle (OSA)
 The speaker affirms the ordering source. (Therefore, he considers it to be better (sometimes with respect to a contextually salient goal) that the proposition modalized by the imperative operator comes out true.)

note: This last (and unsatisfactorily informal) constraint is needed only if we al-

low for ordering sources like *what the hearer wants*; *what the speaker wants*, *what the speaker orders* are inherently specified for the hearer to want them to be taken into account (note that, even in the case of where the speaker is giving orders in a military scenario and may hence not care for these orders to be complied with personally, he is committed to “want” his orders to be complied with in the official sense; but this is a fact about ordering, no matter what signs can be used to achieve an order, e.g., if raising one’s arm is a sign for the addressee to stop, this sign can’t be followed by an assertion like *but I don’t want you to stop*).

idea: the four conditions are trivially fulfilled by $g = \textit{what I order you to do}$; this explains why the form type we have identified as the imperative is prototypically used for ORDERing

the performative effect as a particular speech act type is predicted, if we make the following assumptions about (co-operative) communication and how the particular moves are to be classified:

- (57) A **theory of speech act types** classifies (minimal) sequences of precontext c_1 , intermediate context c_2 , and postcontext c_3 , such that at c_2 , the speaker (tries to) update the Common Ground of c_2 with a linguistic object $[[c_E]]^c$ (a proposition; or an index dependent proposition s, st).

note: The only thing relevant to semantics is the (attempted) update of $CG(c_2)+p/CG(c_2)+q$.

- (58) Update and c_S -belief:
If a speaker attempts to update $CG(c_2)$ with a proposition p , $CG(c_2)$ entails "the speaker believes p ".
- (59) minimal description of $ORDER(\phi)$
 c_1 : ϕ does not follow from what c_A is ordered to do by c_S
 c_2 : $CG(c_2)$ is updated with a linguistic object $[[c_E]]^{c_2}$
 c_3 : ϕ follows from what c_A is ordered to do by c_S

4.1 Detailed example: imperative used for ORDERing

an imperative that is used as an order gives rise to a picture as in figure 1 (the presentation has benefited a lot from comments and suggestions by Michael Franke and Sven Lauer)

- at t_1 , c_S and c_A take it to be possible that - all things being equal so far - may utter *Leave!*, which at the given context (thanks to the interpretation $[[g]]^c$) would express the proposition $\lambda w. (\forall v \in O(cg_F, g, w))[c_A \text{ leaves in } v]$, where $g = \textit{‘what is ordered by } c_S\textit{’}$. Other courses of events are taken to be equally possible.
- in principle, expressing this proposition could amount to being given an order (as in w_3 , or not, as in w_0).
- by (58), at w_0 the speaker has to believe that he is giving an order; since he is not actually doing it, though, the existence of w_0 is incompatible with the authority principle (49) - hence, interpreting the imperative amounts to a presupposition failure if $w_0 \in CG(c)$

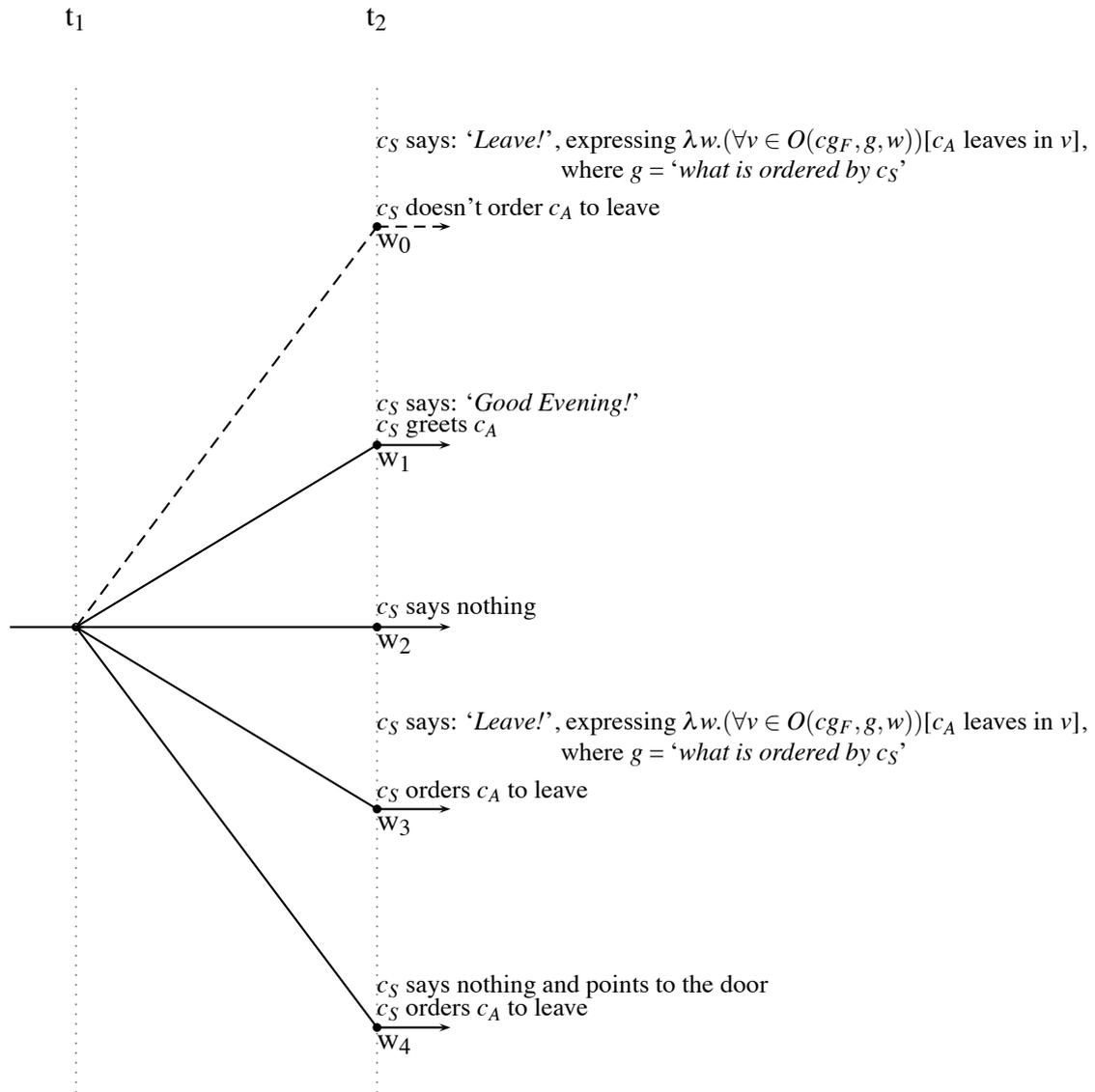


Figure 1: 'Leave!' (in a context where the speaker's orders are salient as a potential ordering source)

- at t_2 , if c_S utters *Leave!*, worlds w_1, w_2, w_4 are eliminated automatically thanks to obvious meta-linguistic information (they do not match the obvious course of events)
- if no presupposition failure occurs, worlds in $CG(c)$ are all like w_3 in that uttering the imperative matches an act in the world that consists in c_S ordering c_A to leave

4.2 Summing up

- does the theory answer PCTE? - the semantic value is highly underspecified, but ORDERS are the prototypical usages for imperatives because an ordering source like *what the speaker orders* at each context fulfills both the authority principle and the ordering source affirmation principle.

- does it answer PASTA? - particular values for modal base and ordering source are supplied by the context; which ones are possible is constrained by the presuppositional meaning component; the particular effect (speech act type) depends on the proposition obtained by filling in these values
- yet to explain: PERMISSIONS, CONCESSIONS, certain pieces of ADVICE

4.3 Remark: Refuting imperatives

in order to refute an imperative, the presuppositions have to be refuted (note that the speaker can only order what he is entitled to order, hence, if he is not entitled to give orders, he is not actually giving them)

- (60) a. A: Geh sofort nach Hause!
A: Go.IMP_{SG} immediately home!
- b. B: Du hast mir überhaupt nichts zu befehlen!
B: You are not in the position to tell me what to do!

with ADVICE replies can come close to confirming/refuting truth

- (61) A: Wie komme ich nach Rüsselsheim? - B: Nimm am besten den 16er!
A: How do I get to Rüsselsheim? - B: take.IMP_{SG} best the 16-line ('Take line 16.')
- a. A: Stimmt! Hatte ich total vergessen. Danke.
A: Right! I'd totally forgotten about it. Thanks.
- b. ??A: Nein, das ist nicht wahr.
No, that is not true.
- c. A'': Nein, das kann nicht stimmen. Der fährt doch nach Osten! Du hast ja gar keine Ahnung.
A'': No, that can't be correct. It goes eastwards! You don't know the first thing about it!

that's not true is slightly weird in this context; but *das* 'that' in (61c) refers exactly to the proposition I claim is expressed by the imperative

4.4 More thoughts on ADVICE and the standard semantics of graded modality

- Back to ESSLLI 2009 and the lazy world u :

- (62) In u , you want is a fee waiver for ESSLLI 2009.
In u , you don't want to work too much (course proposals! - *yikes*)
In u , you get a fee waiver only if you submit a course proposal.
Therefore: ...?

- modal base (bouletic information f_1 + circumstantial information f_2):

- (63) $f_1(u) = \{\lambda v. \text{you obtain a fee waiver for ESSLLI 2009 in } v, \lambda v. \text{you don't submit a proposal in } v\}$

$$f_2(u) = \{\lambda v. \text{you submit a course in } v \text{ or you don't get a fee waiver in } v\}$$

derived (neither is necessary):

$$(64) \quad O(f_2, f_1, u) \cap \{v \in W \mid \text{you submit a course proposal in } v\} \neq \emptyset$$

$$O(f_2, f_1, u) \cap \{v \in W \mid \text{you don't submit a course proposal in } v\} \neq \emptyset$$

- (65) A: See... I want [cf. above] and their regulations are [cf. above]. What shall I do?
 B: Come on, submit something!
 B': Come on, you should really submit something.

problem arises for both modals (standard semantics) and imperatives; compare:

- (66) B'': I would submit something. (It's really not that much work and it's quite a lot of fun.)

A's question amounts to *what are the relevant preferences*

- (67) A: *Given that I get only a fee waiver if I submit, and that I want to not submit, and I want a fee waiver, given what you consider good goals/criteria, what p is necessary?*

that these wishes pertain has been made part of $CG(c)$: hence, given the semantics in (38) it is thus taken into account

B does not consider all of A's wishes, or 'getting all A's wishes fulfilled' the "relevant criterion/good goal" (else he couldn't express a necessity)

B supplies $g_B(u) = \{v \in W \mid \text{you get a fee waiver in } v\}$; for intersection with $CG(c)$:

- (68) $\lambda w. (\forall v \in O(cg_F \cup f, g_B, w))[\text{you submit a course proposal in } v]$,
 where f is empty, $g_B = \text{what } B \text{ considers good goals/the relevant criteria}$

4.5 Comparing graded modals to Portner (2007)'s To-Do-Lists

- declaratives relate to epistemic modals, imperatives relate to priority modals

- (69) A: Go present this proposal to our bankers today!
 B: I should take the 7 a.m. flight to N.Y. then.

imperatives modify To-Do-Lists, and To-Do-Lists help determine the ordering source for deontic modals

- ordering induced by ToDoList & Agent's Commitment: for each participant, the To-Do-List measures rationality:

(70) Partial Ordering of Worlds $<_i$ (Portner (2005:(12)), Portner 2007:(16)):
 For any $w_1, w_2 \in \bigcap CG$, $w_1 <_i w_2$ iff for some $P \in \text{TDL}(i)$, $P(w_2)(i) = 1$ and $P(w_1)(i) = 0$, and for all $Q \in \text{TDL}(i)$, if $Q(w_1)(i) = 1$, then $Q(w_2)(i) = 1$.

(71) Agent's commitment (Portner 2005(13), Portner 2007:(17)):
 For any agent i , the participants in the conversation mutually agree to deem i 's actions rational and cooperative to the extent that those actions in any worlds $w_1 \in \bigcap CG$ tend to make it more likely that there is no $w_2 \in \bigcap CG$ such that $w_1 <_i w_2$.

- problem: (non-)action takes place in time; don't do anything - time eliminates worlds at which you have more properties
- potential problem: trying to convince people that you can't do 'better' is equally rational (depending on how exactly likelihood is defined)

- imperatives influence subsequent priority-modals:

(72) a. Sit down right now. ORDER
 b. Noah should sit down right now, given that he has been ordered to do so.

(73) a. Have a piece of fruit. INVITATION
 b. Noah should have a piece of fruit, given that it would make him happy.

but: b-sentences seem performative, too; this can be modified as follows:

(74) Noah should sit down right now, given what he has been ordered.

the deontic To-Do-List is a subset of the deontic ordering source used subsequently in the same unit of discourse - problem: bouletic-necessity (e.g. Try some chocolate)

- should not update the wishes of the addressee - at best, tells the addressee what follows from his/her wishes

- *given that...* -phrases can be inserted, which suggests that the imperative is to follow from some background, and does not directly update the background

- predictions are similar for ORDERS: what follows from what is optimal according to your orders is what you are ordered to do (compare the discussion of 1)

- details for what I take to be a misprediction on bouletic-cases:

Kratzer definitions for modal base and ordering source, plus To-Do-List-Definition

(75) A selection function f is a (possibly partial) function taking two arguments, a world w and a set of propositions S , and returning a subset of S . *his (52)*

(76) A parametrized selection function h is a (possibly partial) function taking n arguments ($n > 2$), namely $n - 2$ individuals, a world, and a set of propositions S , and returning a subset of S . *his (53)*

picking from sets that include both properties and propositions:

- (77) For any individual x , world w , and set of propositions or properties Π :
- if it is defined, $\underline{\text{deontic}}_x(w, \Pi) = \{y \in \Pi : y \text{ expresses an obligation of } x \text{ in } w \text{ or } y(x) \text{ expresses an obligation of } x \text{ in } w\}$
 - if it is defined, $\underline{\text{bouletic}}_x(w, \Pi) = \{y \in \Pi : y \text{ expresses a desire of } x \text{ in } w \text{ or } y(x) \text{ expresses a desire of } x \text{ in } w\}$
 - if it is defined, $\underline{\text{teleo}}_x(w, \Pi) = \{y \in \Pi : y \text{ expresses a goal of } x \text{ in } w \text{ or } y(x) \text{ expresses a goal of } x \text{ in } w\}$

maybe needed: $\underline{\text{deontic-qua-}c_S}_x(w, \Pi)$ (*what I ordered*)

- (78) Pragmatic function of imperatives:
The canonical discourse function of an imperative clause Φ_{imp} is as follows.
Where C is a context of the form $\langle CG, Q, T, h \rangle$:
- $C + \Phi_{imp}$ is defined only if $h_{addr}(w, T(addr))$ is defined for every $w \in \cap CG$.
 - Provided that it is defined, $C + \Phi_{imp} = \langle CG', Q, T', h \rangle$, where:
 - T' is just like T except that $T'(addr) = T(addr) \cup \{\llbracket \Phi_{imp} \rrbracket\}$, and
 - $CG' = CG \cup \{\{w \in CG : \text{for any set of properties } S, \text{ if } h_{addr} \text{ is defined, } \llbracket \Phi_{imp} \rrbracket \in h_{addr}(w, S)\}\}$

- (79) a. You sit down right now! $h = \text{deontic}_{addr}$
 b. Have a piece of chocolate! $h = \text{bouletic}_{addr}$
 c. Talk to your advisor more often! $h = \text{teleo}_{addr}$

but: at least, (79b) should not add anything to what forms the hearer-bouletic ordering source of a subsequent modal verb.

relationship to Kratzer's theory: a context is $\langle CG, Q, T, h, f, g \rangle$: h picks out subset of To-Do-List for imperatives, f is the modal base, the ordering source is: $\lambda w. h_{subject}(w, g(w))$

- (80) $\llbracket \text{should} \rrbracket^c = \lambda P \lambda x \lambda w : f$ is a realistic conversational background, and g is a prioritizing conversational background. $(\forall v \in O(f, h_x(w, g(w)), w)) [w' \in P(x)]$.

- (81) *Conversational background contains To-Do-List*
Given a context of the form $\langle CG, Q, T, h, f, g \rangle$ for all participants in the conversation α , for all $P \in T(\alpha)$, and for all $w \in \cap CG, P(\alpha) \in g(w)$. *his*
(61)

- (82) *Same selection function*
The selection function strongly tends to remain the same through a unit of discourse. *his* (62)

- worry: one way relationship To-Do-Lists to ordering sources; only imperatives update To-Do-Lists

- relationship conversational backgrounds and To-Do-Lists

(83) #Stay inside all day! (ORDER) Since you enjoy the nice weather, go out and play a little bit. (SUGGESTION)

but: ordering sources as we know them can be conflicting; think of the lazy world

(84) #Don't submit a course proposal! Get a fee waiver for ESSLLI!

- coherence of modal backgrounds [follows from both approaches]

(85) You should give more of your income to the poor. #And you should try this single malt scotch.

- TDL has no effect on the past - no commands w.r.t. the past state [agreed, but:]

(86) Please don't have broken another vase!
Given what my wishes are, it is necessary that you are not in a post-state of having broken another vase.