IMPERATIVES AND INTENTION-BASED SEMANTICS

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IMPERATIVES
(1) Do the right thing
(2) Snow is white
(3) Fly me to the moon and let me play among the stars
(4) Make us omelettes or I'll get us some bagels
(5) Help me if you can
(6) If the manuscript is finished, send it off and I will open up a bottle of wine to celebrate.
(7) Attack if the weather is good.
The weather is good.
So, attack!
THE QUESTION

\[ \text{Snow is white} \] = ???

\[ \text{Do the right thing} \] = ???
(We’re about to go into the bar together. I say:)

**Buy us drinks and I’ll find a table.**

**NOTES:**
- Needn’t have a conditional meaning (Starr 2016, ms).
- Can mean roughly: ‘I’ll find a table. Buy me a drink.’
(We’re at a book store. Each of us has three books, but we only have enough money for five, total:)

**Put back Naked Lunch or I’ll put back Waverley.**

(Starr 2016, ms)

**NOTE:**

- Needn’t have a conditional meaning.
DATAPoint 2
CONDITIONALS

IMPERATIVE CONSEQUENTS:
‘If your friend is tending bar, buy me a drink.’

MIXED-CONJUNCTION:
‘If your friend is tending bar, buy us drinks and I’ll find a table.’

MIXED-DISJUNCTION CONSEQUENTS:
‘If we only have $5, put back Naked Lunch or I’ll put back Waverly.’
Go to the bar and buy me a drink.

So, go to the bar!
IMPERATIVE INFERENCE

Buy me a drink.

You won’t buy me a drink unless you go to the bar.

So, go to the bar!

Attack if the weather is good.

The weather is good.

So, attack!
Post the letter!

So, post the letter or burn the letter!

Pet Herbie!

So, pet Herbie or try to take his ball!
Have a cinnamon role or have a blueberry bar. 
So, have a pork pie.
Work late today.
Command:  **Work late today.**

(Uttered by your boss.)
Request:  Work late today.
(Uttered by your coworker.)
Permission: Work late today.

(Uttered by your spouse.)
Instruction: **Work late today.**

(Uttered by your productivity guru.)
INTENTION-BASED SEMANTICS

cf. Grice, Strawson, Schiffer, Bach & Harnish, Neale
IBS
1. Communication is intention-recognition.

2. Semantic facts should be explained in terms of underlying facts about the psychology of rational communicators.

3. We communicate indirectly when nonlinguistic evidence of our intentions overrides linguistic evidence.
IBS

SEMANTIC FACTS

FACTS ABOUT COMMUNICATION

FACTS ABOUT THE PSYCHOLOGY OF RATIONAL, COOPERATIVE AGENTS
MEANING AND INTENDING

By doing something, x, S, \textit{MEANT} something iff, for some audience, A, and response R, S did x intending

(i) A to have a certain response R

(ii) A to recognise that S did x intending (i)
By doing something, $x$, $S$, meant something iff, for some audience, $A$, and response $R$, $S$ did $x$ intending

(i) $A$ to to have a certain response $R$
(ii) $A$ to recognise that $S$ did $x$ intending (i)

Different kinds of speech act aim at different kinds of responses

i.e., different values for $R$
MEANING AND INTENDING

By doing something, x, S, MEANT something iff, for some audience, A, and response R, S did x intending

(i) A to have a certain response R
(ii) A to recognise that S did x intending (1)

Asserting P

R = belief that P
DIRECTING SOMEONE TO $\varphi$

$I$ A to to have a certain response $R$

$(ii)$ A to recognise that S did $x$ intending $(1)$

$R = \text{intending to } \varphi$
To communicate with someone is to get them to recognize which effect you’re trying to produce in them.
The linguistic meaning of a sentence gives hearers defeasible evidence about what the speaker is trying to communicate.

I.e., it tells hearers what kind of effect the speaker is trying to have (assuming they’re speaking literally).
...is the study of a component of the mind that computes partial and defeasible evidence about what speakers intend by their utterances.

Specifically, it computes $R$ values (or at least properties of $R$ values).
The semantic value of a clause is the kind of mental state that a speaker would try to produce by producing a literal, unembedded utterance of it.
SEMANTIC VALUES: A PROPOSAL
(cf. N. Charlow 2014)

\[
\text{[Snow is white]} = \text{the belief that snow is white}
\]

\[
\text{[Do the right thing]} = \text{the intention to do the right thing}
\]
COMPOSITIONAL SEMANTICS
TWO ASSUMPTIONS

1. Clauses factor, at LF, into a mood-marker and a moodless sentence radical.
TWO ASSUMPTIONS

1. Clauses factor, at LF, into a mood-marker and a moodless sentence radical.

Declarative Mood-Marker

Imperative Mood-Marker

Sentence Radical
TWO ASSUMPTIONS

2. The semantic value of a sentence radical is a set of possible worlds.

\[(\forall \varphi) [\varphi] \in W\]
For any sentence radical $\varphi$:

$[[\top \varphi]]$ is a belief (namely: the belief that $[[\varphi]]$ is true)

$[[! \varphi]]$ is an intention (namely: the intention to make $[[\varphi]]$ true)
How to formalize this?
COGNITIVE MODELS

cf. Charlow (2014)

\[ M_A = \langle B_A, I_A \rangle \]

COGNITIVE MODEL OF A
= a set-theoretic representation of A’s beliefs and plans

\[ B_A \]
A’s BELIEF STATE
= the set of worlds compatible with what A believes

\[ I_A \]
A’s INTENTION STATE
= the set of worlds compatible with what A intends
Beliefs and intentions are formalized as properties of cognitive models:

Belief that dogs are better than cats:
\[ \lambda M_A . B_A \subseteq \{ w : \text{dogs are better than cats at } w \} \]

Intention to high-five Beyoncé:
\[ \lambda M_A . I_A \subseteq \{ w : \text{A high-fives Beyonce at } w \} \]
CLAUSAL SEMANTIC VALUES

So, the semantic values of clauses are properties of cognitive models too.

For any sentence radical $\phi$,

$$[[\neg \phi]]^c = \lambda M_A . B_A \subseteq [[\phi]]^c$$

$$[[! \phi]]^c = \lambda M_A . I_A \subseteq [[\phi]]^c$$
M_A

COGNITIVE MODEL OF A
=a set-theoretic representation of A’s beliefs and plans
...under the idealized assumption that A’s thoughts are ideally coherent.
TWO KINDS OF IDEALIZATION
FIRST: GALILEAN

Conflate mental states with necessarily equivalent contents.

Compare: Galileo’s model of projectile motion without air resistance.

(Distinction between Galilean and Minimal idealization due to Weisberg 2007)
TWO KINDS OF IDEALIZATION
SECOND: MINIMALIST

Mental states are consistent and closed under entailment.

Compare: Explanations of ideal gas laws in which it is assumed that particles in low-pressure gas don’t collide.
TWO KINDS OF IDEALIZATION
SECOND: MINIMALIST

$I_A \subseteq B_A$
TWO KINDS OF IDEALIZATION
SECOND: MINIMALIST

$\mathcal{I}_A \subseteq \mathcal{B}_A$

Doxastic Constraint on Intending
A can’t intend to $\psi$ if it is ruled out by A’s beliefs that A will $\psi$. 
TWO KINDS OF IDEALIZATION
SECOND: MINIMALIST

\[ I_A \subseteq B_A \]

**Strict Means-End Coherence**

If:

(i) A intends to \( \varphi \).

(ii) A believes that \( \psi \)ing is necessary for \( \varphi \)ing.

then:

(iii) A intends to \( \psi \).
So, the semantic values of clauses are properties of cognitive models too.

For any sentence radical $\varphi$,

$$[[\vdash \varphi]]^c = \lambda M_A . B_A \subseteq [[\varphi]]^c$$

$$[[! \varphi]]^c = \lambda M_A . I_A \subseteq [[\varphi]]^c$$
CONJUNCTION

Where $\Phi, \Psi$ are sentences that may be imperatives, declaratives, or combinations of the two:

What is $\left[ \Phi \text{ and } \Psi \right]$?
\[ \Phi \text{ and } \Psi \] =

\[ \lambda M . \langle \Phi \rangle(M) = 1 \text{ and } \langle \Psi \rangle(M) = 1 \]

Intuitively: we use conjunctions to put people into a state of satisfying both conjuncts.
CONJUNCTION

\[ \text{[Buy us drinks and I'll find a table]}^c = \]

\[ \lambda M . I_M \subseteq [A_c \text{ buys us drinks}]^c \quad \text{and} \quad B_M \subseteq [S_c \text{ finds a table}]^c \]

(The property of being a mind that intends to buy drinks and believes that speaker \(c\) will find a table.)
Where $\Phi, \Psi$ are sentences that may be imperatives, declaratives, or combinations of the two:

What is $[\Phi \text{ or } \Psi]$?
A $\Phi$-satisfying submodel of $M$ is a cognitive model $M_\Phi$ such that:

i. $\llbracket \Phi \rrbracket (M_\Phi) = 1$

and

ii. $B_{M_\Phi} \subseteq B_M$

and

iii. $I_{M_\Phi} \subseteq I_M$
**DISJUNCTION**

**WEAK DISJUNCTION**

\[
\llbracket \Phi \text{ or } \Psi \rrbracket = \\
\lambda M . (\exists M\Phi)(\exists M\Psi)(M\Phi \cup M\Psi = M)
\]

Intuitively: we use disjunctions to put people into a state of being committed to at least one disjunct, though they needn’t be settled on which one.
WEAK DISJUNCTION

$[\text{Put back Naked Lunch or I’ll put back Waverly}]^c = \lambda M . M \text{ is in a state of either:}$

(a) intending to put back Naked Lunch; or

(b) believing that speaker $c$ will put back Waverly; or

(c) indecision between options (a) and (b), but commitment to at least one.
A problem with **weak disjunction**:

(1) A: I’ll put back Naked Lunch.

(2) B: Put back Naked Lunch *or* I’ll put back Waverly.

If A is being sincere with (1), then B’s response is *redundant*. So why doesn’t it *sound* redundant?
A problem with **weak disjunction**:

(1) A: Class is in room 505.
(2) B: It’s in 505 or it’s in 506.

If A is being sincere with (1), then B’s response is redundant. So why doesn’t it *sound* redundant?
DISJUNCTION

WEAK DISJUNCTION

⟦Put back Naked Lunch or I’ll put back Waverly⟧^c = λM . M is in a state of either:

(a) intending to put back Naked Lunch; or
(b) believing that speakers will put back Waverly; or
(c) indecision between options (a) and (b), but commitment to at least one.
WEAK DISJUNCTION

\[ \text{[Put back Naked Lunch or I’ll put back Waverly]}^c = \lambda M . M \text{ is in a state of either:} \]

(a) intending to put back Naked Lunch; or
(b) believing that speakers will put back Waverly; or
(c) indecision between options (a) and (b), but commitment to at least one.
Intuitively: In uttering a disjunction, I intend for you to treat both disjuncts as a genuine alternative, at least initially and for the purposes of practical reasoning.

STRONG DISJUNCTION

\[ [\text{Put back Naked Lunch or I’ll put back Waverly}]^c = \lambda M . M \text{ is in a state of indecision between intending to put back Naked Lunch and believing that speaker}_c \text{ will put back Waverly, but commitment to at least one of these options.} \]
A problem with **strong disjunction**?

“I can say to my children at some stage in a treasure hunt, *The prize is either in the garden or in the attic. I know that because I know where I put it, but I’m not going to tell you.* Or I could just say (in the same situation) *The prize is either in the garden or in the attic,* and the situation would be sufficient to appraise the children of the fact that my reason for accepting the disjunction is that I know a particular disjunct to be true [and therefore the other is not an epistemic possibility].”

(Grice 1975; Simons 2004)
Where $\Phi$ is a declarative and $\Psi$ is a declarative, imperative, or combination of the two:

What is $\llbracket$ if $\Phi$ then $\Psi$ $\rrbracket$?
A maximal $\Phi$-supporting submodel $M^{\uparrow \Phi}$ of $M$ meets the following conditions:

(i) $M^{\uparrow \Phi}$ is a submodel of $M$;

(ii) There is no submodel $M^*$ of $M$ such that:

\begin{itemize}
  \item $M^{\uparrow \Phi}$ is a submodel of $M^*$; and
  \item $M^{\uparrow \Phi} \neq M^*$
\end{itemize}

Intuitively: $M^{\uparrow \Phi}$ is one of the “largest” submodels of $M$. 
\[ [\text{if } \Phi \text{ then } \Psi] = \lambda M . (\forall M^\Phi)[\Psi](M^\Phi) \]

M satisfies \([\text{if } \Phi \text{ then } \Psi]\) iff every maximal \(\Phi\)-satisfying submodel of M satisfies \(\Psi\).

**Intuitively:**
In uttering ‘if \(\Phi\) then \(\Psi\)’, I intend you to enter a state of mind such that, if you were to also form the belief \([\Phi]\), it would be irrational for you not to also enter the state \([\Psi]\) (ceteris paribus).
⟦If Quinn is bartending, buy the first round⟧ = \lambda M_A. If A were to be in mental state $M_A$ and believe that Quinn is bartending, A would intend to buy the first round.
CONSEQUENCE
CONSEQUENCE

\{\Phi_1...\Phi_n\} \models \Psi \text{ iff:}

\( (\forall M) \text{ if } \llbracket \Phi_1 \rrbracket (M)=1, \ldots, \llbracket \Phi_n \rrbracket (M)=1, \text{ then } \llbracket \Psi \rrbracket (M)=1 \)

\Psi \text{ follows from } \{\Phi_1...\Phi_n\} \text{ iff every cognitive model that satisfies all of the premises also satisfied the conclusion.}

Intuitively: a coherent mind that satisfied the premises would also satisfy the conclusion.
Go to the bar and buy me a drink.

So, go to the bar!
Attack if the weather is good.
The weather is good.

→ So, attack!
CONSEQUENCE

There are no unicorns

#Bring me a unicorn!

Doxastic Constraint on Intending
A can’t intend to $\psi$ if it is ruled out by A’s beliefs that A will $\psi$. 
CONSEQUENCE

Buy me a drink.

You won’t buy me a drink unless you go to the bar.

⇒ So, go to the bar!

Strict Means-End Coherence

If:

(i) A intends to φ.
(ii) A believes that ψing is necessary for φing.

then:
(iii) A intends to ψ.
Post the letter!

#So, post the letter or burn the letter!

This is predicted only if we adopt STRONG DISJUNCTION.

(Otherwise, we could treat it as a pragmatically.)
You intend to post the letter.

#So, post the letter or burn the letter!

You intend to post the letter.

≠ You intend to post the letter or to burn the letter.
Have tea or have coffee.

$\Rightarrow$ So, have tea.

This sounds valid only if the conclusion is read as a weak use of the imperative: a permission, acquiescence, invitation, or instruction.

So what’s the story with “weak uses”? 
Here’s clause for weak imperatives that would validate this inference:

\[ [i\varphi]^c = \lambda M_A . I_A \cap [\varphi]^c \neq \emptyset \]

Intuitively: in saying ‘have tea’, my aim was for you to make having tea compatible with your plans (at least tentatively and for the purposes of practical reasoning).

This could be one of two semantic readings for imperatives or it could result from pragmatic weakening.
FREE CHOICE

Have tea or have coffee.

⊢ So, have tea.

Valid if:

We adopt **STRONG DISJUNCTION**; and

The conclusion’s weak reading is semantic.

(Either could turn out to be pragmatic instead.)
Have tea or have coffee.
\( \implies \) So, have tea.

You intend to have tea or to have coffee.
\( \implies \) It is compatible with your intentions to have tea.
SPEECH ACTS
SPEECH ACTS

Command: *Work late today.*
(Uttered by your boss.)

Request: *Work late today.*
(Uttered by your coworker.)
Command: Work late today. (Uttered by your boss.)

Request: Work late today. (Uttered by your coworker.)

Guiding idea

When we issue a directive, we normally also communicate a reason for the addressee to comply.

Directives of different kinds are backed by different kinds of reasons. (cf. Schiffer 1972)
SPEECH ACTS

Command: **Work late today.**
(Uttered by your boss.)

Backed by an indirect conditional threat, or an indirect appeal to authority.

Request: **Work late today.**
(Uttered by your coworker.)

Backed by an indirect expression of the speaker’s desire.
What about non-directive uses?

Instruction:  Work late today.

(Uttered by your productivity guru.)
Instruction: **Work late today.**
(Utttered by your productivity guru.)

**Guiding idea**

Here we *make as if* to direct someone to do something, in order to indirectly communicate a reason for them to do it.

Compare Grice’s accounts of irony and metaphor.

e.g. “He’s a fine friend.”
What about “weak” uses?

Permission: **Work late today.**

(Uttered by your spouse.)
SPEECH ACTS

Permission:  Work late today.
(Uttered by your spouse.)

Compare weak uses of declaratives, e.g., in brainstorming contexts:

“It’s lupus.”

These work like epistemic modals— attempts to make the content compatible with the addressee’s belief state.

A form of pragmatic weakening?
CONCLUSIONS

1. A theory of the semantics and pragmatics of imperatives with broad empirical coverage.

2. A new kind of theoretical motivation thanks to IBS: e.g., not only *predictions* of inferential data; also independently motivated *explanations* for why these data arise.

3. A case study in how IBS and compositional semantics can be mutually supporting.
THANKS