Imperative logic and logic of desire

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Plan of the talk

- To examine the possibilities of connecting imperative logic and logic of desire using dynamic approach in formal semantics.
  - Semantics of imperatives.
  - Semantics of desire.
  - Criticism of Cross’ approach.
Background for IL

- Imperative logic.
  - Chellas, Brian (1971) Imperatives. Theoria 37: 114-129
  - Kanger, Stig (1972). Law and logic. Theoria 38: 105--129
  - Ross, Alf (1941). Imperatives and logic. Theoria 7: 53--71
Background for LD

From (beginnings in) the logic of action to an imperative logic

Types of actions and types of imperatives
Three points action semantics

- G.H. von Wright
  - *The initial state* which the agent changes or which would have changed if the agent had not been active.
  - *The end-state* which results from the action.
  - *The counter-state* which would have resulted from agent’s passivity.
Classification of actions

- The actions that bring about a change:
  - Actions of producing,
  - Actions of destroying a state of affairs.

- The actions that prevent a change:
  - Actions of sustaining,
  - Actions of suppressing a state of affairs.
Imperatives as commanded changes

- E.J. Lemmon (1965)
  - Imperatives: commanded changes
  - A kind of change expression: !(A/B)

- K. Segerberg (1990)
  - Imperatives: prescribed actions

- N. Belnap and M. Perloff (1988), STIT logic
  - "Agentive": content of Imperative
Threefold division of imperatives

- Produce-destroy imperatives; complementary type:
  - !(¬A/A);!(A/¬A)

- Maintain-suppress imperatives; symmetric type:
  - !(A/A);!(¬A/¬A)

- “One-sided” imperatives:
  - !(τ/A);!(τ/¬A)

- Main dissimilarities:
  - Contra Lemmon: restricted syntax
  - Contra Segerberg, Belnap: inclusion of information on initial situation.
Negative imperatives

- Negative “theme of demand”:
  - Which pairs to use out of four basic action types?
  - Alternatives for the same initial situation
  - 'Do not sustain A!' vs. 'Destroy A!'

- Contraposition for conditional imperatives:

  $\neg !(A/A) \iff !(A/\neg A)$
  
  $(A/\top) \rightarrow !(\neg B/B) \iff !(\neg B/\neg B) \rightarrow \neg (A/\top)$
Imperatives as prescribed actions and dynamic semantics

\[ \text{commanded change} \]

\[
\begin{array}{c}
\text{word to world fit} \\
\text{world to word fit}
\end{array}
\]

\[ !\left( \varphi \right) \div \psi \]

initial situation \hspace{1cm} resulting situation
3 point model

- What we need?
  - In relational part:
    - Temporality (two instants: before and after).
      - Branching time: 3 moments and 2 instants.
    - Possibility and avoidability.
    - Preference.
  - In “objects”:
    - Information on initial, final and counter state.
Absurdity test

- If one of its “semantic components” is violated, the imperative becomes absurd.
  - *Open the door yesterday!*  
    - Violated temporality.
  - *There is no wine here. Have some of it!*  
    - Violated possibility.
  - *Stay tall!*  
    - Violated avoidability.
  - *It is better to leave the window open. Close it!*  
    - Violated preference.
  - *The window is open. Open it!*  
    - Violated informational part.
Dynamic models

- Semantics of dynamic models (using "Tarski-variations" and "Kripke-variations") is inherently "social" and "pragmatic".
  - Meaning of a sentence may be understood in terms of change in Hearer's mental state.
  - Meaning of a sentence may be understood in terms of "social change" that its utterance brings about.
Dynamic models

- Two ways to think about dynamic semantics of imperatives.
  - “Intrasubjectively”: changes in the mental state of the Hearer.
  - “Intersubjectively”: changes of social relations.

- Examples.
  - If the Speaker’s command ‘Open the window’ is accepted:
    - The motivational state of the Hearer will be (eventually) changed.
      - The state of window being open will be his goal.
    - The obligation pattern within group consisting of Speaker and Hearer will be changed.
      - The Hearer will be obliged to see to it that the window is open. On the other hand, it will be forbidden for The Speaker to see to it that the window is closed.
Set of models

Is the language expressive enough?

Accessible

Maximal states

Motivational states

Failure states

Inaccessible
Inferred command

- Bring Pluto\(\times\) inside!
- Fido\(\bullet\) is inside.
- The two dogs cannot be in the same spot.
- Therefore, take Fido outside!
Reduction of uncertainty in practical setting

⇒ Bring Pluto inside! ⇒

⇒ Fido is inside ⇐

⇒ The two dogs cannot be in the same spot ⇒

tığ Take Fido outside! daq
Might be good...: defeasible suggestion

- Non persistent test sentences:
  - $\sigma[\text{might } \varphi]=\sigma$ if $\sigma[\varphi] \notin \text{Failure}$
  - $\sigma[\text{might } \varphi]=1$ if $\sigma[\varphi] \in \text{Failure}$

- Bring Pluto inside!; Fido and Pluto cannot be in the same spot; Therefore *prima facie*, it might be good to take Fido outside!... But...
Non monotonic consequence relation

⇒ Bring Pluto inside!⇒

⇒ Fido and Pluto cannot be in the same spot⇒

⇒ Fido is outside⇒

† It might be good to take Fido outside! †

⇐ Keep Fido outside! ⇐
Linguistics and psychology

Dynamic approach suggests the existence of a connection between two logics:

- Logic of imperatives (logic of commands or requests) is defined in terms of properties of “mental states”.
- Logic of cognitive-motivational states
- Are logics connected?

One non-classical consequence

\[ \varphi_1; \ldots; \varphi_n \vdash_{\text{update-to-test}} \psi \]

iff

\[ [\varphi_1] \ldots [\varphi_n] \sigma = [\varphi_1] \ldots [\varphi_n][\psi] \sigma, \text{ for any } \sigma \]

Classical consequence

\[ \varphi_1; \ldots; \varphi_n \vdash_{\text{test-to-test}} \psi \]

iff

\[ [\varphi_1] \sigma = \ldots = [\varphi_n] \sigma = [\psi] \sigma, \text{ for any } \sigma \]

Mental state | Intentionality description
--- | ---
\[ [\varphi_1] \sigma \] | \( D_1 \)
\vdots | \vdots
\[ [\varphi_n] \sigma \] | \( D_n \)
\[ [\psi] \sigma \] | \( C \)

\( \{D_1, \ldots, D_n\} \vdash C \Rightarrow \varphi_1; \ldots; \varphi_n \vdash_{\text{test-to-test}} \psi? \)

\( \varphi_1; \ldots; \varphi_n \vdash_{\text{test-to-test}} \psi \Rightarrow \{D_1, \ldots, D_n\} \vdash C? \)
Desires

- [...] we may now distinguish what we might call various levels of want or desire, beginning at the lowest level: (i) He prefers A to not-A. (ii) He opposes not-A. (iii) He favors A. (iv) He favors A and opposes not-A.

- [...] The terms 'want' and 'desire', in their ordinary use, may be used to refer to any of these various levels of want or desire. They are generally used in such a way that the objects of want and desire are restricted to objects that are future [...] and to objects such that the persons who wants or desires them does not believe them to be impossible.

  - Roderick Chisholm
Short comment

- He prefers A to not-A.
- Preference in Chisholm’s quotation is to be understood as:
  - Preference between mutually exclusive, jointly exhaustive ways things may be.
  - Not as preference between features or properties (e.g. ‘She prefers honesty to politeness’).
  - Pettit’s distinction.
- This kind of preference may be modeled making a twofold partition of states (absoulte desire).
  - E.g. Doyle, Shoham, Wellman
- ...the persons who wants or desires them does not believe them to be impossible.
  - One of the factual components.
Mickey desires (wants) to bring Pluto inside. Mickey believes that Fido is inside. Mickey believes that the two dogs cannot be in the same spot. Therefore, Mickey should desire (want) to take Fido outside.

Bring Pluto inside! Fido is inside. The two dogs cannot be in the same spot. Therefore, take Fido outside!
Examining a logic of desire

Received view: 2 components

- "Received view" on:
  - Sentences.
    - 2 components: modal element (mood indicator) and sentence radical.
  - Speech acts (illocutionary acts).
    - 2 components: illocutionary force and propositional content.
  - Intentional states.
    - 2 components: attitude and propositional content.
Received view: direction of fit

"Received view" on basic types of sentences, speech acts and intentional states with respect to their direction of fit.

- Direction of fit.
  - Word (mind) to world fit.
    - Indicatives; assertions; beliefs.
  - World to word (mind) fit.
    - Imperatives; requests; desires.
Criticism of the received view

- One more quote.
  - To say that desires have world-to-mind direction of fit is to hold that desires are goal-seeking: their satisfaction requires that the world conform to a certain ideal.
    - Philip Pettit

- Symmetric and complementary imperatives have two directions of fit.
  - Information on the initial situation: word-to-world fit.
  - Information on the final situation: word-to-world fit.
Two directions of fit instead of one

- If the “commanded change” approach is correct and if accepting an imperative changes Hearer’s motivational state, then desires (wants) have two directions of fit.

\[
\begin{align*}
  &\text{before : } \neg A \quad / \quad \text{after : } A \\
  &\text{word-to-world} \quad / \quad \text{world-to-word}
\end{align*}
\]

\[
\text{Desires}_i(\neg A/A) \Rightarrow \text{Believes}_i(\text{before : } \neg A)
\]
An example

- Cross takes into account the two directions of desire.
- Desires are analyzed in terms of goals ($R^1$) and beliefs ($R^2$).
  - Desires as “goal-belief discrepancy”.

$$V^*(\Delta p, w) = \begin{cases} 
T, & \text{if } V^*(p, w') = T \text{ and } V^*(p, w'') = F \\
& \text{for all } w', w'' \text{ such that } \langle w, w' \rangle \in R^1 \\
& \text{and } \langle w, w'' \rangle \in R^2; \\
F, & \text{otherwise.}
\end{cases}$$
Trouble

- Cross’ modeling lacks temporal dimension.
- Within such a model the “state of satisfaction” cannot be distinguished from “maintain-type” of desire.

\[
V^*(_{\oplus p, w}) = \begin{cases} 
T, & \text{if } V^*(p, w') = T \text{ and } V^*(p, w'') = T \\
\text{for all } w', w'' \text{ such that } \langle w, w' \rangle \in R^1 \\
\text{and } \langle w, w'' \rangle \in R^2; \\
F, & \text{otherwise.}
\end{cases}
\]
Embedding

\[ \vdash S \times F; L_1 = (S_1, F_1, \models_1); L_2 = (S_2, F_2, \models_2) \]
\[ \tau : F_1 \rightarrow F_2; \pi : S_2 \rightarrow S_1 \]
\[ L_1 \text{ is embedded in } L_2 \text{ iff} \]
\[ \forall \varphi \forall s [s \models \varphi \rightarrow \exists \psi \exists r (r \models \varphi \wedge \tau(\varphi) = \psi \wedge \pi(r) = s)] \]
\[ \tau (\Delta p) = \lnot (\neg P / P) \]
\[ \pi ((W \times \text{Inst}, H, \text{Pref})) = (W, \text{mem}_1(H)^2, \text{mem}_1(\text{Pref})^2) \]
Preservation of semantics properties

- Semantic relations in one (embeddable) logic are preserved (via translation and projection) in the other (embedding).
- Works well from Cross’ “discrepancy” logic to imperative logic.
  - But not in the opposite direction.
From desires to imperatives

- Castelfranchi and Paglieri note “three undesired properties” in the notion of desire.
  - “Expected pleasure”.
  - “Endogenous pro-attitudes”.
  - “Non pursued or even ‘non pursable’ states of affairs”.

- If so logic of desire cannot be embedded into imperative logic.
  - There will be some “formally satisfiable” desire in the “logic of impossible desires” and their imperative translation will be unsatisfiable.
Conjecture and further research

- There is a connection between imperative logic and logic of motivational states (pro-attitudes).
  - The category of such states should be discovered (intentions?).
Thank you!