

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
 - Belnap, Nuel and Perloff, Michael (1988). Seeing to it that: a canonical form of agentives. *Theoria* 54: 175--199
 - Kanger, Stig (1972). Law and logic. *Theoria* 38: 105--129
 - Lemmon, Edward (1965). Deontic logic and the logic of imperatives. *Logique et Analyse* 8: 39-71.
 - Ross, Alf (1941). Imperatives and logic. *Theoria* 7: 53--71
 - Segerberg, Krister (1990). Validity and satisfaction in imperative logic. *Notre Dame Journal of Formal Logic* 31: 203--221
 - Wright, Georg Henrik von (1963). *Norm and Action: A Logical Inquiry*. Routledge and Kegan Paul



Background for LD

- Cross, Charles B. (1997) The modal logic of discrepancy, *Journal of Philosophical Logic* 26: 143—168
- Castelfranchi, Cristiano and Paglieri, Fabiano (2007) The role of belief in goal dynamics: prolegomena to a constructive theory of intentions. *Synthese* 155: 237—263

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:
 - $!(\neg A/A);!(A/\neg A)$
- Maintain-suppress imperatives; symmetric type:
 - $!(A/A);!(\neg A/\neg A)$
- “One-sided” imperatives:
 - $!(\top/A);!(\top/\neg A)$
- Main dissimilarities:
 - *Contra* Lemmon: restricted syntax
 - *Contra* Segerberg, Belnap: inclusion of information on initial situation.



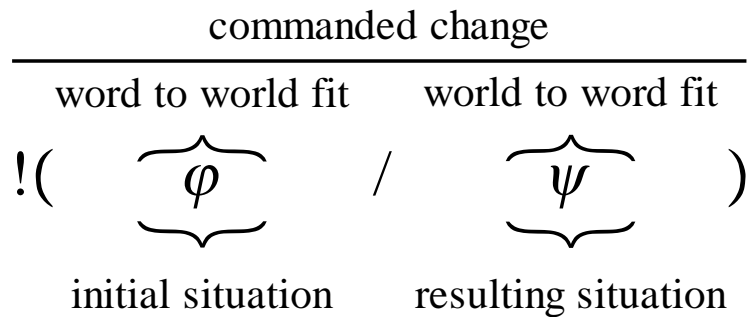
Negative imperatives

- 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.

$$\neg!(A/A) \Leftrightarrow !(A/\neg A)$$

$$\bullet(A/\top) \rightarrow !(\neg B/B) \Leftrightarrow !(\neg B/\neg B) \rightarrow \bullet(\neg A/\top)$$

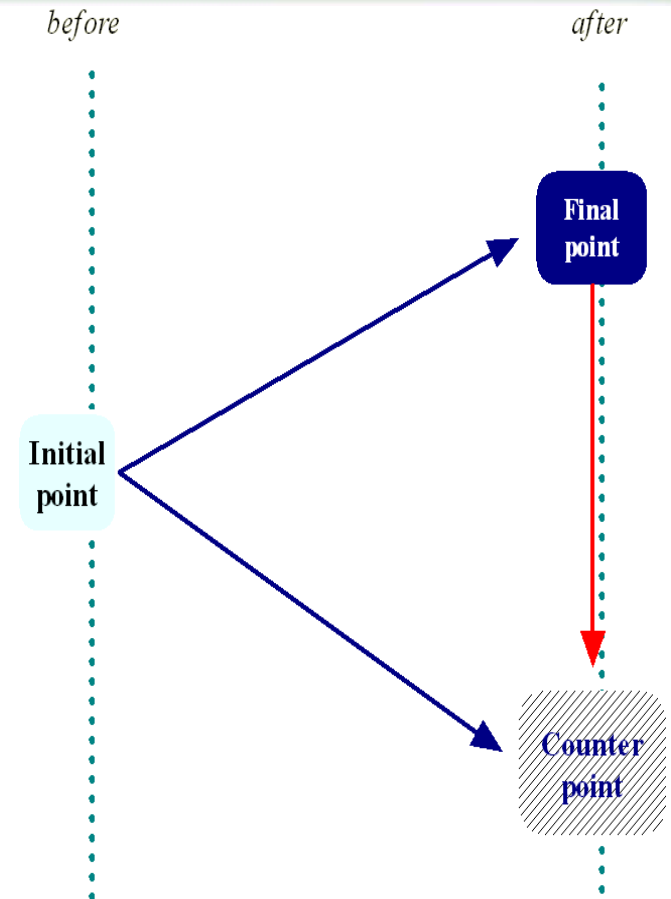
Imperatives as prescribed actions and dynamic semantics





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

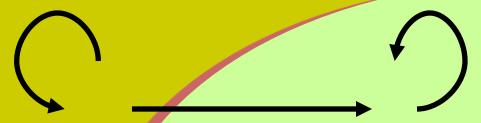
- Two ways to think about dynamic semantics of imperatives.
 - **“Intrasubjectively”**: changes in the mental state of the Hearer.
 - **“Intersubjectively”**: changes of social relations.
- Examples.
 - If the Speaker’s command ‘Open the window’ is accepted:
 - The motivational state of the Hearer will 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

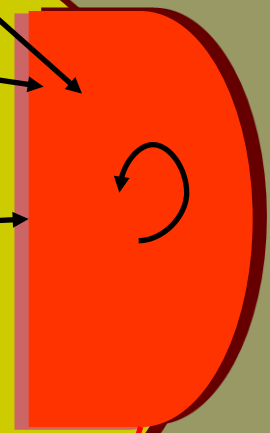
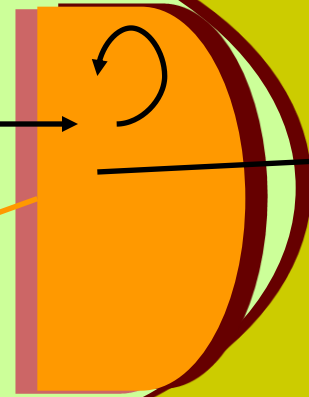
Imperative logic
and
logic o

Is the language expressive enough?

Accessible



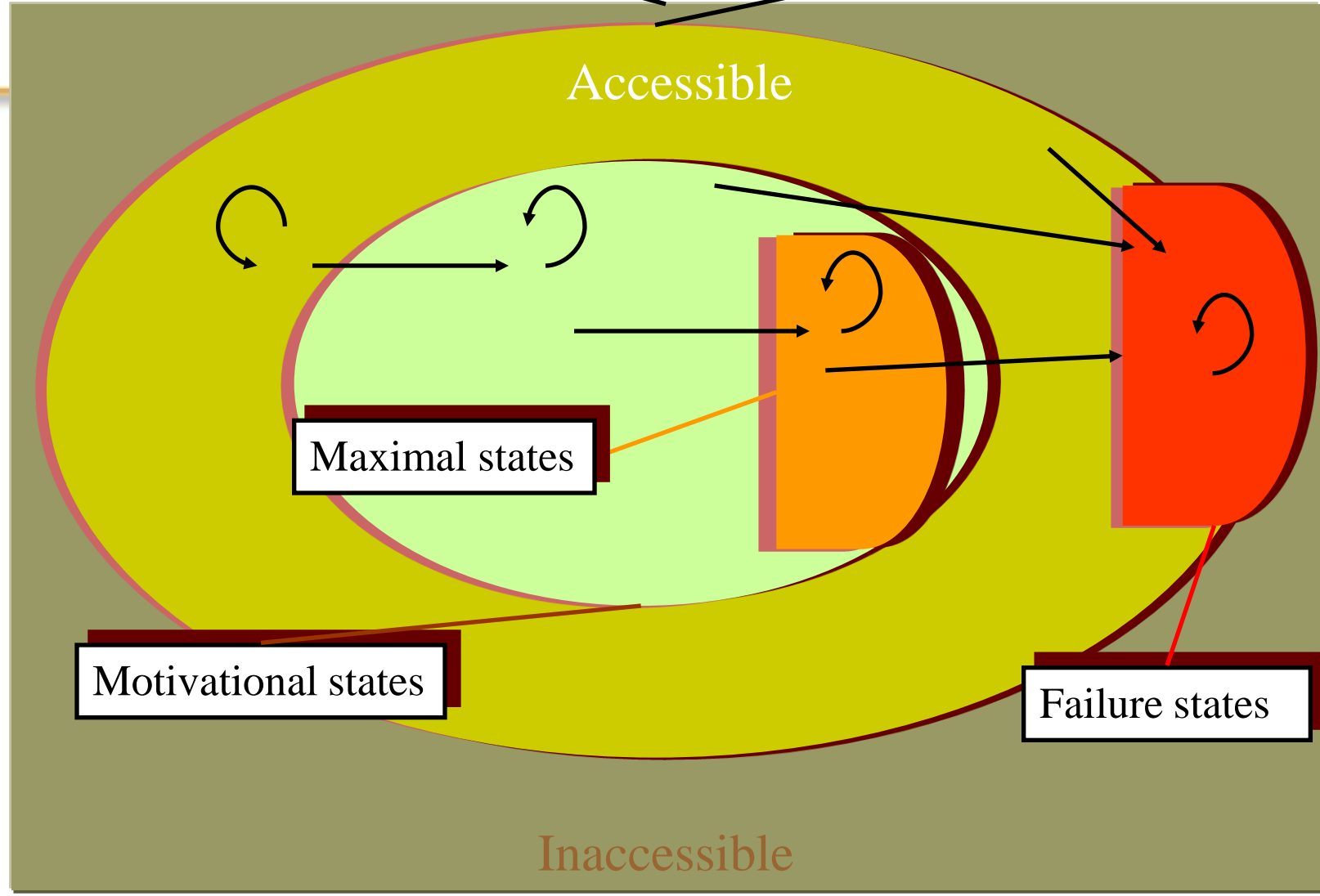
Maximal states



Motivational states

Failure states

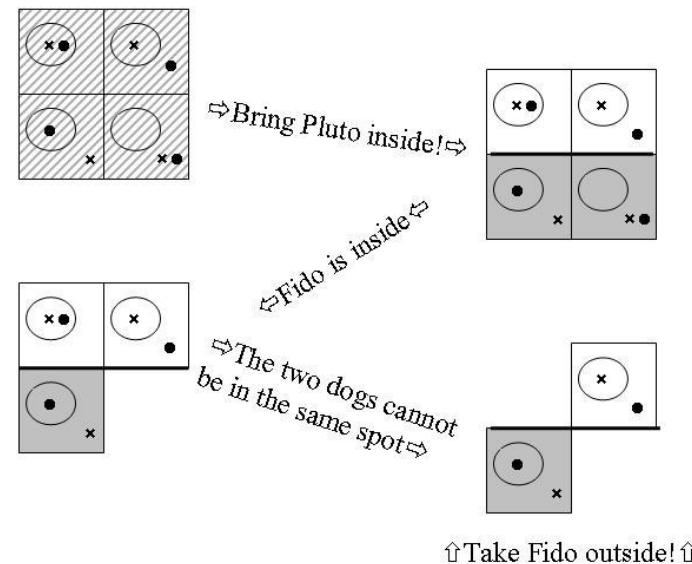
Inaccessible





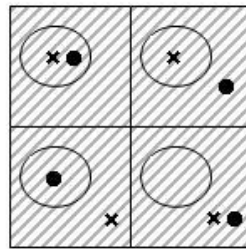
Inferred command

- Bring Pluto^x inside!
- Fido[•] is inside.
- The two dogs cannot be in the same spot.
- Therefore, take Fido outside!

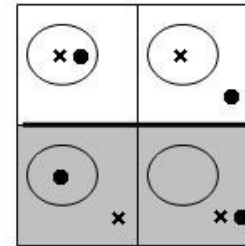




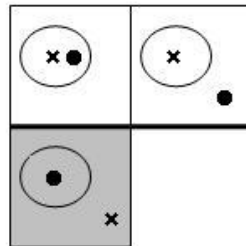
Reduction of uncertainty in practical setting



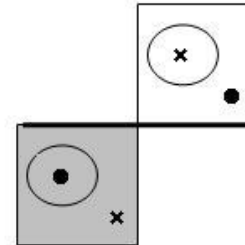
⇒ Bring Pluto inside! ⇒



⇒ Fido is inside ⇒



⇒ The two dogs cannot be in the same spot ⇒

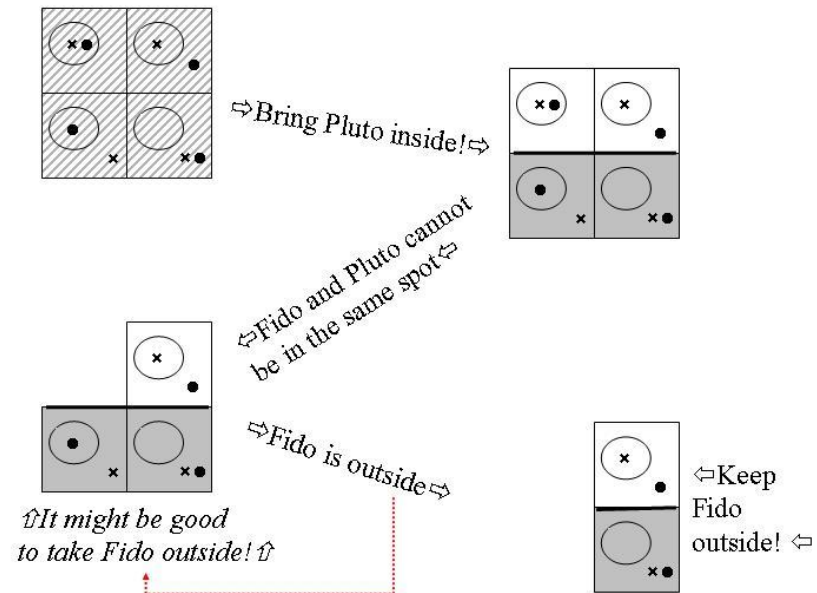


↑ Take Fido outside! ↑



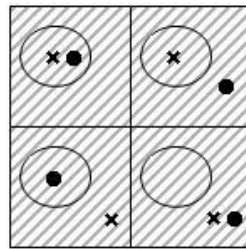
Might be good...: defeasible suggestion

- 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...

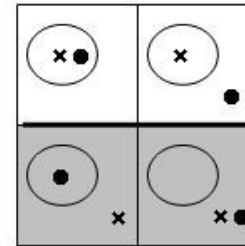




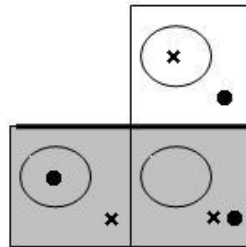
Non monotonic consequence relation



⇒ Bring Pluto inside! ⇒

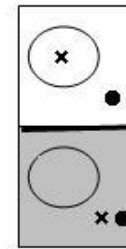


⇔ Fido and Pluto cannot
be in the same spot ⇔



⇒ 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

$$\varphi_1; \dots; \varphi_n \models_{\text{update-to-test}} \Psi$$

iff

$$[\varphi_1] \dots [\varphi_n] \sigma \dashv\vdash [\varphi_1] \dots [\varphi_n] [\Psi] \sigma, \text{ for any } \sigma$$

Classical consequence

$$\varphi_1; \dots; \varphi_n \models_{\text{test-to-test}} \Psi$$

iff

$$[\varphi_1] \sigma \dashv\vdash \dots \dashv\vdash [\varphi_n] \sigma \Rightarrow [\Psi] \sigma, \text{ for any } \sigma$$

Mental state Intentionality description

$$[\varphi_1] \sigma \quad D_1$$

$$\vdots \quad \vdots$$

$$[\varphi_n] \sigma \quad D_n$$

$$[\Psi] \sigma \quad C$$

$$\{D_1, \dots, D_n\} \models C \Rightarrow \varphi_1; \dots; \varphi_n \models_{\text{test-to-test}} \Psi?$$

$$\varphi_1; \dots; \varphi_n \models_{\text{test-to-test}} \Psi \Rightarrow \{D_1, \dots, D_n\} \models C?$$



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 (absolute 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.



Translation



- 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

Cross, Charles B. (1997) The modal logic of discrepancy, *Journal of Philosophical Logic* 26: 143—168



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.

$$! \left(\underbrace{\text{before} : \neg A}_{\text{word-to-world}} / \underbrace{\text{after} : A}_{\text{world-to-word}} \right)$$

$$\text{Desires}_i(\neg A/A) \Rightarrow \text{Believes}_i(\text{before} : \neg A)$$



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”.

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



Trouble

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

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

Embedding

$\models \subseteq S \times F; L_1 = \langle S_1, F_1, \models_1 \rangle; L_2 = \langle S_2, F_2, \models_2 \rangle$

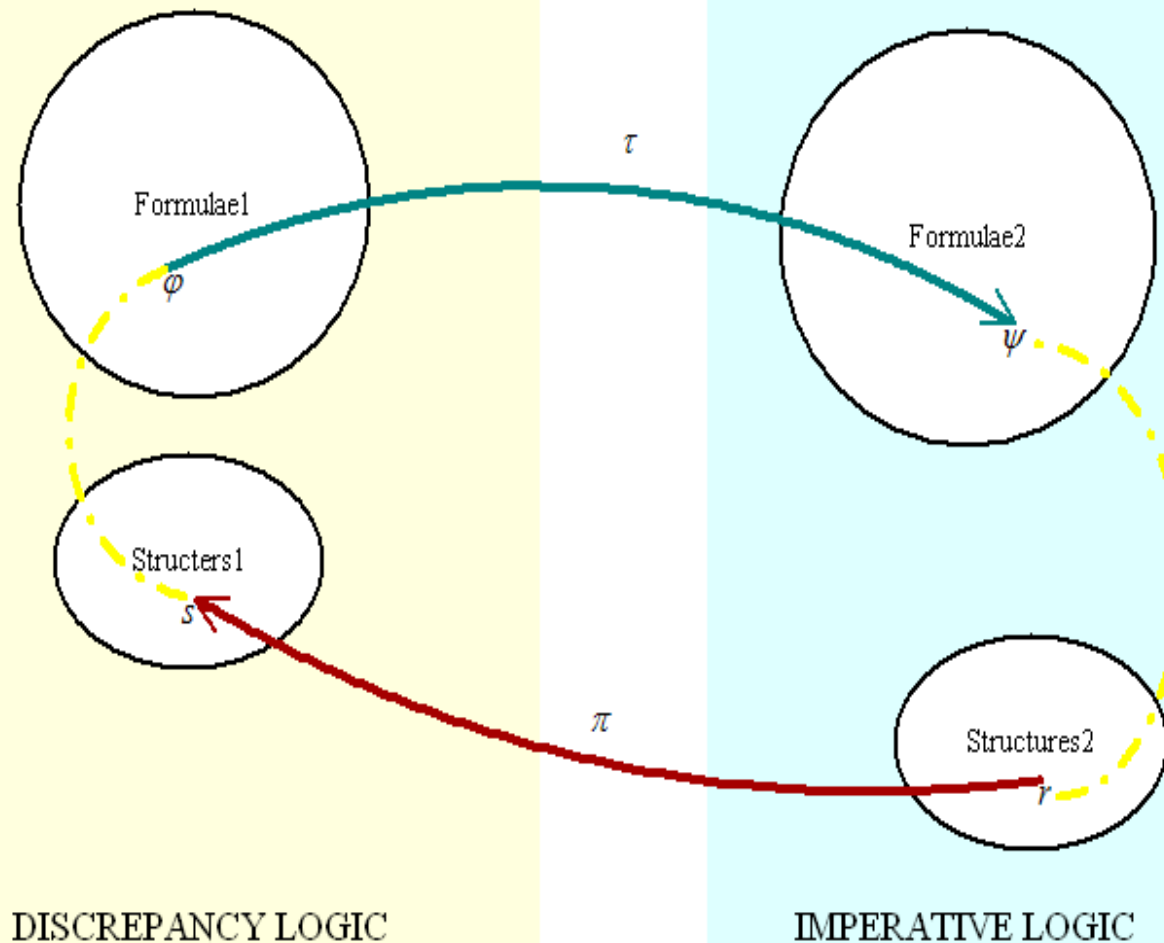
$\tau : F_1 \rightarrow F_2; \pi : S_2 \rightarrow S_1$

L_1 is embedded in L_2 iff

$\forall \varphi \forall s [s \models_1 \varphi \rightarrow \exists \psi \exists r (r \models_2 \psi \wedge \tau(\varphi) = \psi \wedge \pi(r) = s)]$

$\tau(\Delta p) = !(-P/P)$

$\pi(\langle W \times Inst, H, Pref \rangle) = \langle W, mem_1(H)^2, mem_1(Pref)^2 \rangle$





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!
