Expressing Permission

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Outline

Free Choice Permission
Early Statement

Strong Permission and Free Choice

"If we are told that we may do this thing or that thing, we normally understand this to mean that we may do the one thing but also the other thing. The distribution principle, in other words, would seem to be $P(p \vee q) \leftrightarrow Pp \,\&\, Pq$. But this principle goes with a different idea of permittedness from the one which obeys the interdefinition schema $P := {\sim}O{\sim}$. We can call it a notion of strong permission. It is related to possibility (freedom) of choice between alternatives." (von Wright 1968: 4-5)

Free Choice Permission
In a Concrete Context

Background

Union members need to vote strategically in a committee election. An election of Anderson to the committee and an election of Brady to the committee will promote the interests of the union. It's impossible to say whether both would do them any better than one. Further, only senior members get to vote for two candidates, while junior members get to vote for just one. One representative has the job of telling their very loyal members how they are permitted to vote.

Free Choice Permission
The Narrow Implication

Authoritative labor representative to union members:

(1) a. Members may vote for Anderson or Brady
b. Members may vote for Anderson and members may vote for Brady

Narrow Free Choice Permission (NFC)

May (A ∨ B) ⇒ May A ∧ May B

- '⇒': shorthand for 'implication', neutral between semantic consequence and pragmatic implicature

(von Wright 1968: 4-5, Kamp 1973)

Free Choice Permission
Is Narrow Implication a Cancelable Implicature?

- Implication doesn't pass standard cancellation test

(2) *Authoritative labor representative:*
a. Members may vote for Anderson or Brady
b. #But members may not vote for $\left\{ \begin{array}{l} \text{Anderson} \\ \text{Brady} \end{array} \right\}$

- But implication can be 'defeated'...

Free Choice Implication
Defeated by the Ignorant and Rude?

- Ignorance (Kamp 1978: 271)

(3) *Authoritative labor representative*:
a. Members may vote for Anderson or Brady, but I don't know which
b. # Members may vote for $\left\{ \begin{array}{l} \text{Anderson} \\ \text{Brady} \end{array} \right\}$

- Uncooperativeness (Simons 2005: 273)

(4) *Authoritative labor representative*:
a. Members may vote for Anderson or Brady, but I won't tell you which
b. # Members may vote for $\left\{ \begin{array}{l} \text{Anderson} \\ \text{Brady} \end{array} \right\}$

- Open question how best to capture this

Free Choice Permission
The Wide Implication

Authoritative labor representative to union members:

(5) a. Members may vote for Anderson or members may vote for Brady
b. Members may vote for Anderson and members may vote for Brady

Wide Free Choice Permission (WFC)

May A ∨ May B ⇒ May A ∧ May B

- '⇒': shorthand for 'implication', neutral between semantic consequence and pragmatic implicature

(Kamp 1978: 273; Zimmermann 2000; Geurts 2005; Simons 2005)

Free Choice Permission

Reduce Wide to Narrow? (Simons 2005: 281-2)

- Reduce WFC to NFC via (ATB) movement?
  - May A ∨ May B transformed to May (A ∨ B)
- Major over-generation problems:

(6) *Authoritative labor representative*:
   a. Members may vote for Anderson and members may vote for Brady
   b. # Members may vote for Anderson and Brady

  - May A ∧ May B doesn't transform to May (A ∧ B), despite being formally parallel
- Problematic for many accounts

Modal Orthodoxy

May $= \Diamond$

Orthodox Possible Worlds Semantics

1. $[\![\mathsf{A}]\!] = \{w \mid w(\mathsf{A}) = 1\}$
2. $[\![\neg\phi]\!] = W - [\![\phi]\!]$
3. $[\![\phi \wedge \psi]\!] = [\![\phi]\!] \cap [\![\psi]\!]$
4. $[\![\phi \vee \psi]\!] = [\![\phi]\!] \cup [\![\psi]\!]$
5. $[\![\Diamond\phi]\!] = \{w \mid \exists w' \colon \in R(w, w') \;\&\; w' \in [\![\phi]\!]\}$
   - $R(w, w')$: w' is 'accessible' from w

Classical Truth and Consequence

Truth $w \vDash \phi \iff w \in [\![\phi]\!]$

Consequence $\phi \vDash \psi \iff [\![\phi]\!] \subseteq [\![\psi]\!]$

Consequence of the Orthodoxy

Possibility and Disjunction

Fact 1: $\Diamond \mathsf{A} \vee \Diamond \mathsf{B} \nvDash \Diamond \mathsf{A}$ and $\Diamond(\mathsf{A} \vee \mathsf{B}) \nvDash \Diamond \mathsf{A}$

1. First would require:
   - $[\![\Diamond\mathsf{A}]\!] \cup [\![\Diamond\mathsf{B}]\!] \subseteq [\![\Diamond\mathsf{A}]\!]$
   - But this only holds when $[\![\Diamond\mathsf{B}]\!] = \varnothing$
2. Second would require:
   - $[\![\mathsf{A} \vee \mathsf{B}]\!] \subseteq [\![\mathsf{A}]\!]$
   - Would hold only when $[\![\mathsf{B}]\!] = \varnothing$

- Orthodoxy doesn't explain NFC or WFC
- Un-orthodoxy: May (A ∨ B) is semantically equivalent to May A ∧ May B (e.g. Geurts 2005; Simons 2005)

Dual Prohibition

Good for the Orthodoxy, Bad for the Un-orthodoxy

Authoritative labor representative to union members:

(7) a. Members may not vote for Anderson or Brady
   b. Members may not vote for Anderson and members may not vote for Brady

Dual Prohibition (DP)

¬May (A ∨ B) ⇒ ¬May A ∧ ¬May B

(Alonso-Ovalle 2006; Fox 2007)

- Orthodox Explanation: $\neg\Diamond(\mathsf{A} \vee \mathsf{B}) \vDash \neg\Diamond\mathsf{A} \wedge \neg\Diamond\mathsf{B}$
- More unorthodox semantics or Unorthodox LF/Pragmatics?

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Children's Knowledge of Free Choice Inferences and Scalar Implicatures

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The Dilemma

Hard Choices

More Unorthodox Semantics

1. Aloni (2007)
   - Semantic explanation of NFC
   - Potential semantic explanation of DP
   - No account of WFC
2. Barker (2010)
   - Semantic explanation of NFC
   - Pragmatic explanation of DP
   - Evidence for pragmatic account of DP holds for NFC
   - Problematic account of WFC
3. Aher (2012); Willer (2015)
   - Semantic explanation of NFC, DP
   - No account of WFC

Resource Sensitivity

Permission as Partial, Discrete

(8) *Authoritative labor representative*:
  a. Members may vote for Anderson or Brady
  b. # Members may vote for both Anderson and Brady
  c. # Members may not vote for both Anderson and Brady

(Simons 2005; Barker 2010)

Resource Sensitivity (RS)

1. $\mathsf{May}\,(A \vee B) \not\Rightarrow \mathsf{May}\,(A \wedge B)$
2. $\mathsf{May}\,(A \vee B) \not\Rightarrow \neg\mathsf{May}\,(A \wedge B)$

Resource Sensitivity

Information Comes In and Permissions Expire (Asher & Bonevac 2005: 304)

(9) *Authoritative labor representative to union*:
Members may vote for Anderson or Brady

(10) *Every member just voted for Anderson. Senior members are about to cast additional vote*:
Members may vote for Brady

Resource Sensitivity (RS)

1. $\mathsf{May}\,(A \vee B) \not\Rightarrow \mathsf{May}\,(A \wedge B)$
2. $\mathsf{May}\,(A \vee B) \not\Rightarrow \neg\mathsf{May}\,(A \wedge B)$
3. $\mathsf{May}\,(A \vee B), A \not\Rightarrow \mathsf{May}\,B$

Resource Sensitivity
Logical Inference Not Welcome!

New Background

Members need to vote strategically for a two person committee, the only outcome that will promote the union's interests is an Anderson and Brady committee. Neither alone does any good. The ballots have separate bubbles for "Anderson and Brady", "Anderson" and "Brady".

(11) *Authoritative labor representative*:
  a. Members may vote for Anderson and Brady
  b. # Members may vote for $\left\{ \begin{array}{l} \text{Anderson} \\ \text{Brady} \end{array} \right\}$

Resource Sensitivity
So Far

Resource Sensitivity (RS)

1. $\mathsf{May}\,(A \vee B) \not\Rightarrow \mathsf{May}\,(A \wedge B)$
2. $\mathsf{May}\,(A \vee B) \not\Rightarrow \neg\mathsf{May}\,(A \wedge B)$
3. $\mathsf{May}\,(A \vee B), A \not\Rightarrow \mathsf{May}\,B$
4. $\mathsf{May}\,(A \wedge B) \not\Rightarrow \mathsf{May}\,A, \mathsf{May}\,B$

Resource Sensitivity
And Back to Strong Permission

Newer Background

Members need to vote for a committee, but all choices serve the union's interests equally well. Further, the union has been criticized for controlling their members too much.

Resource Sensitivity
And Back to von Wright (1968) on Strong Permission

(12) *Authoritative labor representative*:
We will not be permitting or requiring you to vote for any candidate in this election. Do as you wish!

(13) *Paranoid Member*:
I've hear you've forbidden voting for Anderson.

(14) *Authoritative labor representative*:
  a. No, it's not the case that members must not vote for Anderson
  b. # No, you may vote for Anderson

Weak Permission

What's compatible w/explicit requirements and permissions

Strong Permission

Explicitly permitted actions; may be none!

Resource Sensitivity

And Strong Permission

Resource Sensitivity (RS)

1. $\text{May}\,(A \vee B) \not\Rightarrow \text{May}\,(A \wedge B)$
2. $\text{May}\,(A \vee B) \not\Rightarrow \neg\text{May}\,(A \wedge B)$
3. $\text{May}\,(A \vee B), A \not\Rightarrow \text{May}\,B$
4. $\text{May}\,(A \wedge B) \not\Rightarrow \text{May}\,A, \text{May}\,B$
5. $\neg\text{Must}\,\neg A \not\Rightarrow \text{May}\,A$

Different Starting Point

Expressing permission involves incrementally building a partial plan of what to do, rather than describing what the fully precise permission facts in some world are.

Basic Dynamic Semantics

Just Information (Veltman 1996)

Orthodox Picture

- Sentences represent by refer to regions of logical space
- Interpreters use utterances of them to shift to region of logical space within region referred to

Dynamic Semantics (Purely Informational Version)

- Sentences: recipes for moving around logical space
- Atomics: zoom in on a particular region
- Conjunction: apply each recipe in turn
- Disjunction: apply recipes separately; 'merge' results
- Negation: remove region scope would zoom to

The Dynamic Picture

In More Detail

The Basic Idea

Assign each ϕ a function $[\phi]$ encoding how it changes s:
$s[\phi] = s'$ (I.e.: $[\phi](s) = s'$)

- s is a set of worlds

Dynamic Informational Semantics (Veltman 1996)

1. $s[A] = \{w \in s \mid w(A) = 1\}$
2. $s[\neg\phi] = s - s[\phi]$
3. $s[\phi \wedge \psi] = (s[\phi])[\psi]$
4. $s[\phi \vee \psi] = s[\phi] \cup s[\psi]$

The Dynamic Picture

How Atomics Provide Information

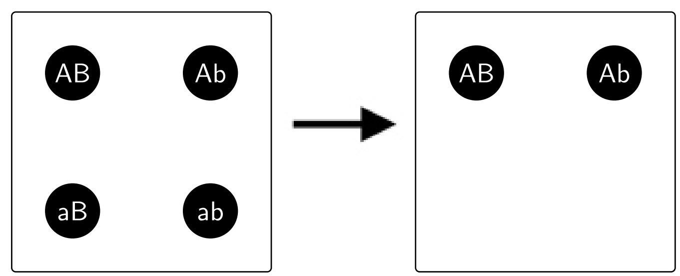


Figure: $W[A]$

- Uppercase for True, Lowercase for False
- $\{w_{AB}, w_{Ab}, w_{aB}, w_{ab}\}[A] = \{w_{AB}, w_{Ab}\}$

The Dynamic Picture

Deontics Don't Inform, They Motivate!

Cyanide and Happiness © Explosm.net

The Attraction of Expressivism

Deontic Claims Don't Describe Preferences, They Express Them

Expressivist Theses

1. **Communication**: "To express a state of mind is not to say that one is in it" (Gibbard 1986: 473).
2. **Explanation**: "The semantic properties of sentences are to be explained, fundamentally, in terms of properties of the attitudes conventionally expressed by utterances of those sentences" (Silk 2014: §1).
3. **Non-representation**: The states of mind expressed by sentences are non-representational, and, more specifically, motivational.

The Dynamic Picture

Extended to Deontics

Dynamics of Permissions π

May ϕ is analyzed dynamically in terms of how it updates requirements/permissions π, rather than information s. (Kamp 1973; Lewis 1979; van Rooij 2000)

Novel Model of π

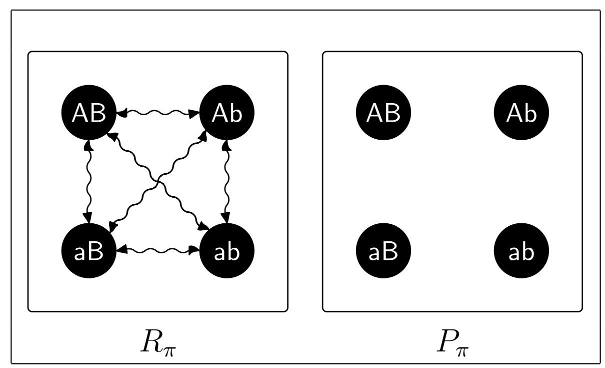
A practical frame π consists of:

- R_π: requirements, preferences between worlds
- P_π: strong permissions, preferences between worlds

- Sentences influence substates $s^\pi := \langle s, \pi \rangle$

Permission Dynamics

Substates Visualized



$\pi = \mathbf{I}$

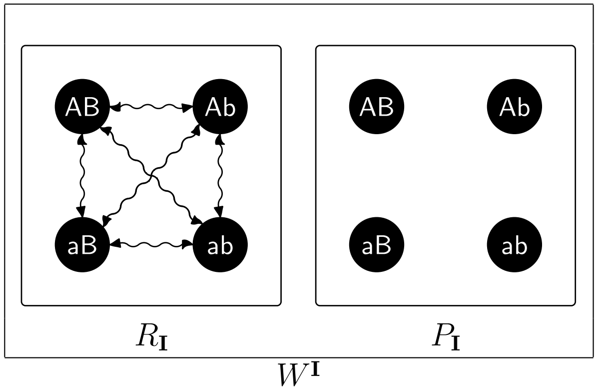
$s^\pi = W^{\mathbf{I}}$

Figure: Initial Substate: No Info, Req's or Strong Permissions

- A not strongly permitted, but not forbidden

Permission Dynamics

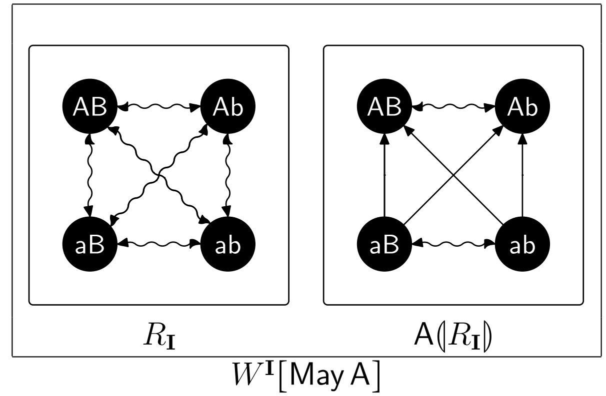
Expressing Permission, Simplified



- May A: test whether A is compatible w/$R_{\mathbf{I}}$-best worlds
  - *Yes*: create new P from $R_{\mathbf{I}}$, w/preference for A-worlds
  - *No*: reduce s to $\varnothing$

Permission Dynamics

Expressing Permission, Simplified



- May A: test whether A is compatible w/$R_{\mathbf{I}}$-best worlds
  - *Yes*: create new P from $R_{\mathbf{I}}$, w/preference for A-worlds
  - *No*: reduce s to $\varnothing$

Permission Dynamics

States versus Substates

States S

A state S is a set of substates $S = \{s_1^{\pi_1}, \dots, s_n^{\pi_n}\}$

- Each $s_i^{\pi_j}$ is competing for control of agent's actions and beliefs (Minsky 1985; Brooks 1991)

Dynamic Connective Semantics (Starr 2016)

1. $S[\mathsf{A}]$: eliminate $\neg$A-worlds from each substate
2. $S[\neg\phi]$: for each substate,
   a. Eliminate worlds that would survive update w/ϕ
   b. Remove preferences ϕ would add to $\mathbf{I}$
3. $S[\phi \wedge \psi] = (S[\phi])[\psi]$
4. $S[\phi \vee \psi] = S[\phi] \cup S[\psi]$

Permission Dynamics

States Visualized

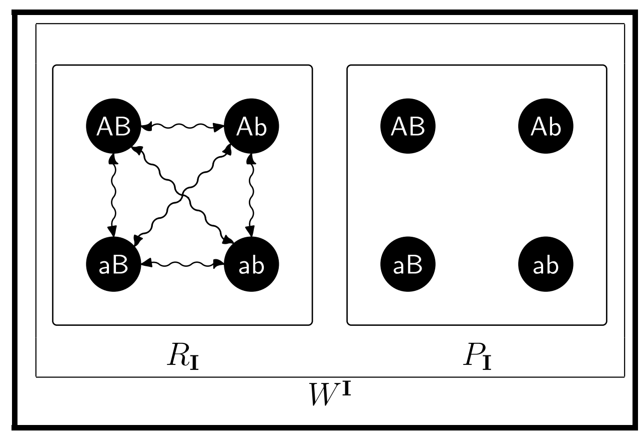


Figure: Initial State $\mathbf{0}$

Disjunction Dynamics

Disjunction Creates Substates

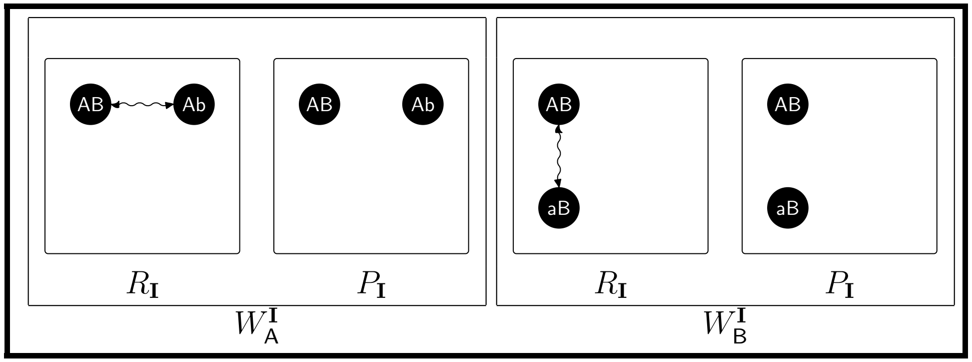


Figure: $\mathbf{0}[\mathsf{A} \vee \mathsf{B}]$

Permission Dynamics

Expressing Permission also Creates Substates

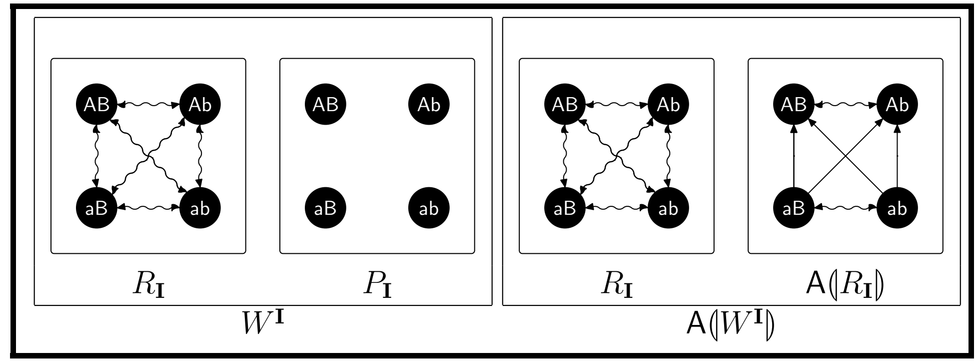


Figure: $\mathbf{0}[\mathsf{May\ A}]$

- May A: $\forall s^\pi \in S$, test whether A is compatible w/R_π-best worlds
  - *Yes*: create new P from R_π, w/preference for A-worlds; then union set of new substates with S
  - *No*: reduce every s to $\varnothing$

Permission Dynamics

Expressing Permission also Creates Substates

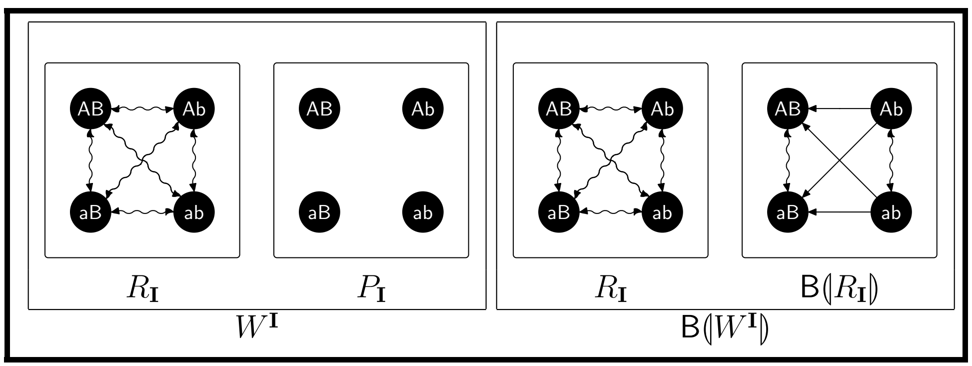


Figure: $\mathbf{0}[\mathsf{May\ B}]$

- May B: $\forall s^\pi \in S$, test whether B is compatible w/R_π-best worlds
  - *Yes*: create new P from R_π, w/preference for B-worlds; then union set of new substates with S
  - *No*: reduce every s to $\varnothing$

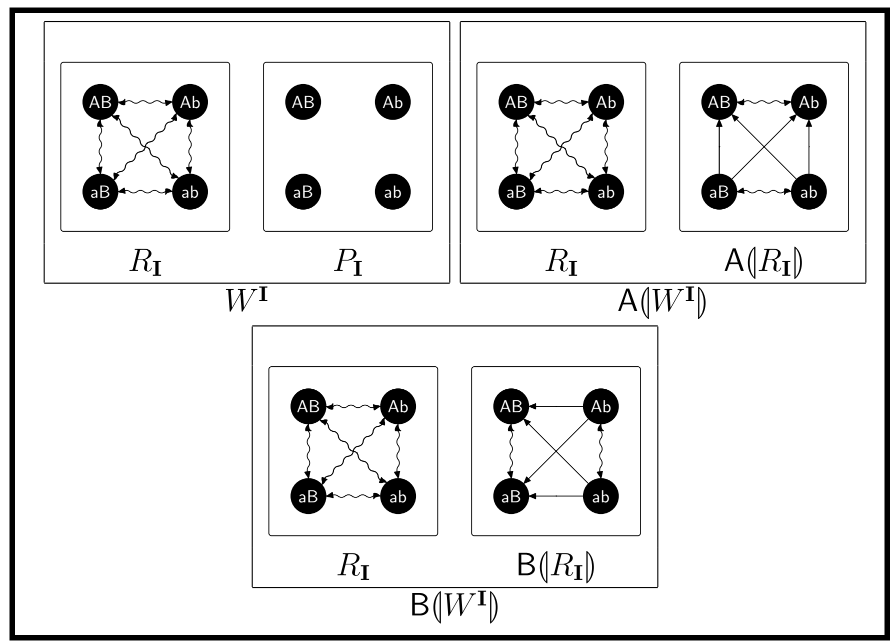


Figure: $\mathbf{0}[\mathsf{May\ A} \vee \mathsf{May\ B}]$

Towards a Practical Logic

Support and Consequence (Kamp 1973; Veltman 1996; van Rooij 2000)

Practical Support ($S \Vdash \phi$)

ϕ doesn't change any of the π's at play in S

- $S \Vdash \phi \iff \Pi_S = \Pi_{S[\phi]}$
- $\Pi_S = \{\pi \mid \exists s \neq \varnothing \colon s^\pi \in S\}$

Practical Consequence ($\phi_1, \ldots, \phi_n \Vdash \phi$)

After accepting $\phi_1, \ldots, \phi_n$, ψ doesn't change π's at play

- $\phi_1, \ldots, \phi_n \Vdash \psi$: $\forall S \colon S[\phi_1] \cdots [\phi_n] \Vdash \psi$

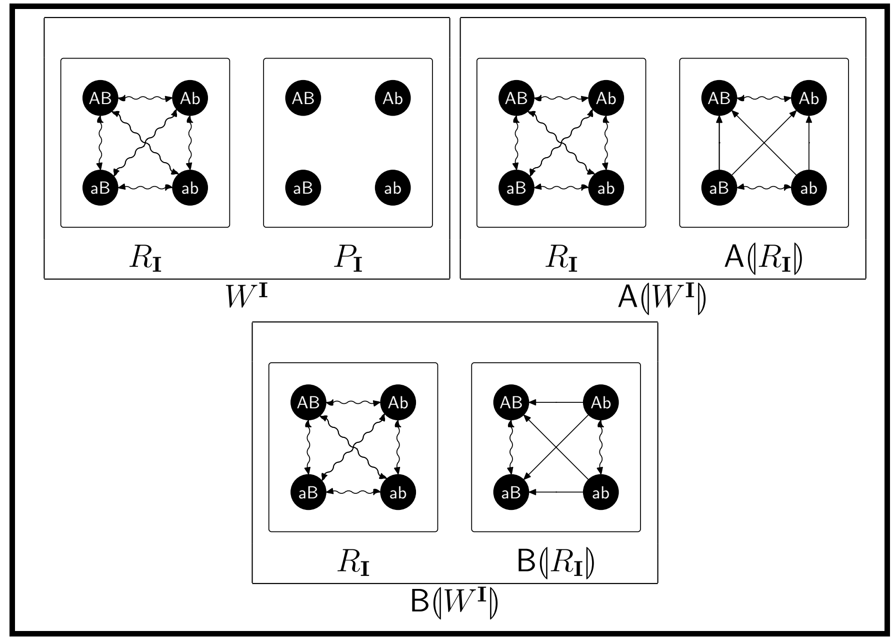


Figure: $\mathbf{0}[\mathsf{May\ A} \vee \mathsf{May\ B}] \Vdash \mathsf{May\ A}$

Explaining Narrow Free Choice

Nothing New Here

- WFC is explained without movement
  - What about NFC?
- Explaining $\mathsf{May}\,(\mathsf{A} \vee \mathsf{B}) \Vdash \mathsf{May\,A} \wedge \mathsf{May\,B}$:
  1. $\mathsf{May}\,\phi$ sensitive to $alt_s(\phi)$'s (Simons 2005; Aloni 2007)
     - $alt_S(\phi) \coloneqq \{a \mid a^{\pi_i} \in S[\phi]\}$
  2. $alt_{\mathbf{0}}(\mathsf{A} \vee \mathsf{B}) = \{W_{\mathsf{A}}, W_{\mathsf{B}}\}$
  3. $\mathsf{May}\,\phi$ tests for each $s^\pi \in S$ that each $a \in alt_{\{s^\pi\}}(\phi)$ is compatible w/R_π-best worlds
- This renders $\mathsf{May\,A} \vee \mathsf{May\,B}$ and $\mathsf{May}\,(\mathsf{A} \vee \mathsf{B})$ equivalent

Explaining Dual Prohibition

Expressive Negation!

Dual Prohibition (DP)

$\neg\mathsf{May}\,(\mathsf{A} \vee \mathsf{B}) \Rightarrow \neg\mathsf{May\,A} \wedge \neg\mathsf{May\,B}$

(Alonso-Ovalle 2006; Fox 2007)

Expressive Negation (Starr 2016)

$S[\neg\phi]$: for each substate $s^\pi \in S$,

a. Eliminate worlds that would survive in $\{s^\pi\}[\phi]$

b. Remove preference from π that ϕ would add to $\mathbf{I}$

Prohibition Dynamics

When Prohibition Fails

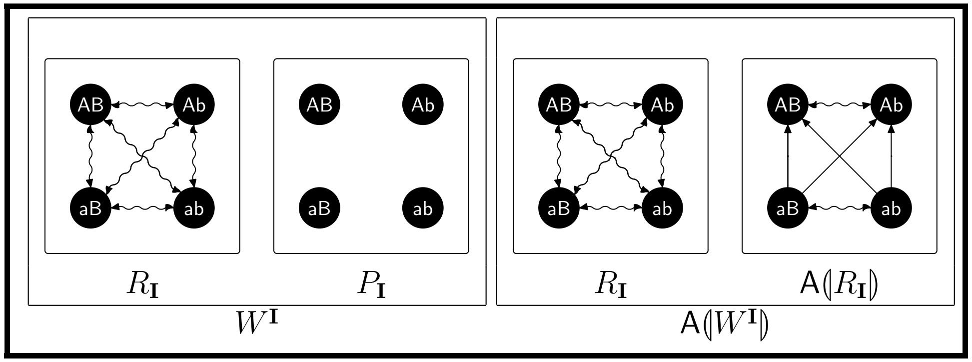


Figure: $\mathbf{0}$[May A]

- $\mathbf{0}$[May A][¬May A] = ?

Prohibition Dynamics

When Prohibition Fails

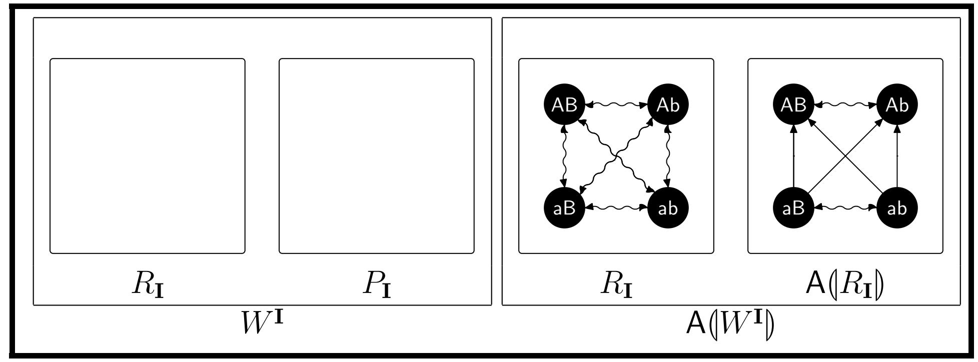


Figure: First Step Toward $\mathbf{0}$[May A][¬May A]

Prohibition Dynamics

When Prohibition Fails

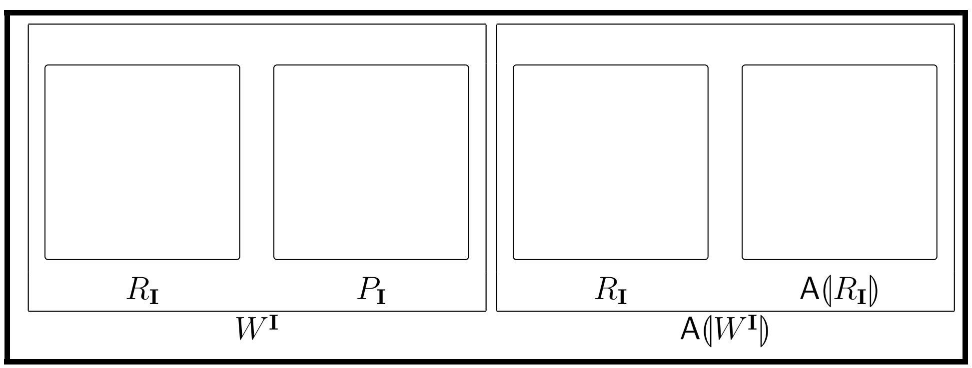


Figure: $\mathbf{0}$[May A][¬May A]

Explaining Dual Prohibition

Expressive Negation!

Dual Prohibition (DP)

¬May (A ∨ B) ⇒ ¬May A ∧ ¬May B

(Alonso-Ovalle 2006; Fox 2007)

- One way to test for this is to see whether just ¬May A $\Vdash$ ¬May (A ∨ B)
- That validity would indicate that ¬May (A ∨ B) has weak reading akin to ¬May A ∨ ¬May B
- ¬May A $\nVdash$ ¬May (A ∨ B) in this system because of expressive negation

Prohibition Dynamics

A State that Supports ¬May A

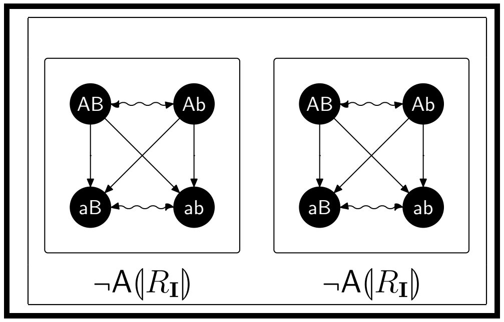


Figure: ¬A Required

- Update w/¬May A:
  1. Update state w/May A fails giving information ∅
     - $W - \varnothing = W$
  2. No A-preferences to remove

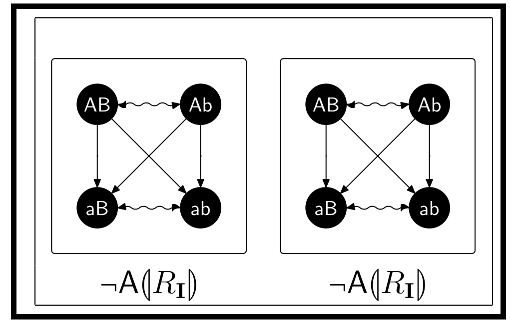


Figure: Updating state that will support ¬May A w/¬May (A ∨ B)

- Update w/¬May (A ∨ B):
  1. Updating state w/May (A ∨ B) tests that *both* alt's are compatible w/$\neg A(\!|R_{\mathbf{I}}|\!)$-best worlds
     - A-alternative is not
     - Giving ∅, and $W - \varnothing = W$
  2. Remove permissive preferences May (A ∨ B) would add
     - Namely aB > Ab

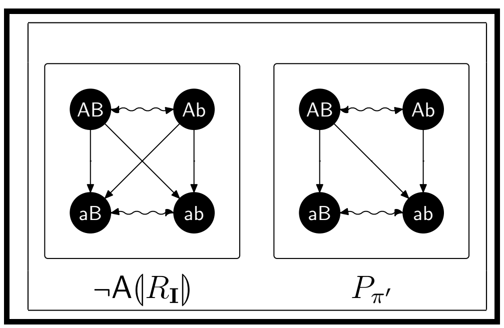


Figure: Updating state that will support ¬May A w/¬May (A ∨ B)

- Update w/¬May (A ∨ B):
  1. Updating state w/May (A ∨ B) tests that *both* alt's are compatible w/$\neg A(\!|R_{\mathbf{I}}|\!)$-best worlds
     - A-alternative is not
     - Giving ∅, and $W - \varnothing = W$, so no effect here...
  2. Remove permissive preferences May (A ∨ B) would add
     - Namely aB > Ab

Dual Prohibition

Predicted Semantically

- Key components
  1. Expressive negation
  2. Consequence relation that tracks changes to π
- This semantics thereby predicts:
  1. Non-classical behavior above/below disjunction
  2. Classical behavior re-emerges under negation

Resource Sensitivity
With Fresh Eyes

Resource Sensitivity (RS)

1. $\mathsf{May}\,(\mathsf{A} \vee \mathsf{B}) \not\Rightarrow \mathsf{May}\,(\mathsf{A} \wedge \mathsf{B})$
2. $\mathsf{May}\,(\mathsf{A} \vee \mathsf{B}) \not\Rightarrow \neg\mathsf{May}\,(\mathsf{A} \wedge \mathsf{B})$
3. $\mathsf{May}\,(\mathsf{A} \vee \mathsf{B}), \mathsf{A} \not\Rightarrow \mathsf{May}\,\mathsf{B}$
4. $\mathsf{May}\,(\mathsf{A} \wedge \mathsf{B}) \not\Rightarrow \mathsf{May}\,\mathsf{A}, \mathsf{May}\,\mathsf{B}$
5. $\neg\mathsf{Must}\,\neg\mathsf{A} \not\Rightarrow \mathsf{May}\,\mathsf{A}$

Getting Defeated
By Ignorance and Rudeness

- Explanation of *but I won't tell you which* or *but I don't know which* follow ups?
- *I won't tell you which [permissions hold]*
- *which* picks up on two salient division of substates
  - Says only one holds
  - Induces convey higher-order uncertainty about what state should be
- $S = \{s_1^{\pi_1}, \ldots, s_n^{\pi_n}, s_1^{\mathsf{A}(\pi_1)}, \ldots, s_n^{\mathsf{A}(\pi_n)}, s_1^{\mathsf{B}(\pi_1)}, \ldots, s_n^{\mathsf{B}(\pi_n)}\}$
  - $S = \{s_1^{\pi_1}, \ldots, s_n^{\pi_n}, s_1^{\mathsf{A}(\pi_1)}, \ldots, s_n^{\mathsf{A}(\pi_n)}\} \not\Vdash \mathsf{May}\,\mathsf{B}$
  - $S = \{s_1^{\pi_1}, \ldots, s_n^{\pi_n}, s_1^{\mathsf{B}(\pi_1)}, \ldots, s_n^{\mathsf{B}(\pi_n)}\} \not\Vdash \mathsf{May}\,\mathsf{A}$
- Consequence holds only if it holds on all resolutions of the uncertainty. (Van Fraassen 1966; Stalnaker 1981)

Conclusion
What's Done and What's Not-so-done

Done

1. Semantically explain wide and narrow FCP
2. Semantically explain Dual Prohibition
   - Relying crucially on expressive negation and practical consequence
3. Semantically explain resource sensitivity effects
4. Sketch of how ignorance/uncooperativity defeat free choice through higher-order uncertainty

Not Done

- Account for wide variety of free choice effects in wide variety of constructions bearing no superficial resemblance to permission

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