A Note on *Any* and Simplification

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Any in the Antecedent of Conditionals

- *Any* is licensed in the antecedent of conditionals.

(1) If any kangaroo lost its tail, it would fall over.

- This is one of the driving arguments against the classical semantics for conditionals (Kratzer, 1986, 2012; Lewis, 1973; Stalnaker, 1968) and for von Fintel's alternative (von Fintel, 1999, 2001).

This Talk

1. I review the argument brought about by the licensing of *any* against the classical semantics.
2. **Simplification inferences** from conditionals appear to defuse the argument.
3. Assuming Bar-Lev & Fox (2020) treatment of simplification, I show that the argument preserves its bite once we look at [any NP_{PL}].

The Classical Semantics for Conditionals

The Monotonicity of Conditionals I

- (2-a) does not imply (2-b).

(2) a. If kangaroos lost their tails, they would fall over.
b. If kangaroos lost their tails but used crutches, they would fall over.

- The classical semantics for conditionals (CS) is designed to account for the absence of such entailment (Kratzer, 1986, 2012; Lewis, 1973; Stalnaker, 1968).

Similarity Orderings Between Worlds

- CS relies on a relation of similarity to a world $\mathtt{w}$.
- Lewis (1973) represents $\succeq_{\mathtt{w}}$ as a system of concentric spheres.

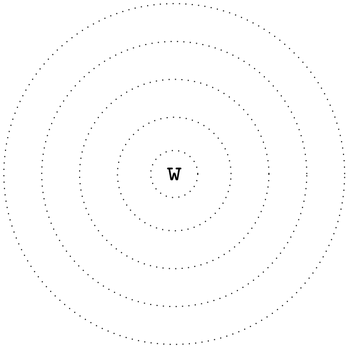

Figure: System of Spheres

The Classical Meaning of Conditionals

- We can now talk about the ϕ-worlds most similar to $\mathtt{w}$.

$$\mathtt{max}(\mathtt{w}, \phi) := \left\{ \mathtt{w}' \;\middle|\; \begin{array}{l} \phi \text{ is true in } \mathtt{w}' \text{ and, for any } \mathtt{w}'' \\ \text{s.t. } \phi \text{ is true in } \mathtt{w}'', \mathtt{w}' \succeq_{\mathtt{w}} \mathtt{w}'' \end{array} \right\}$$

- A conditional is true in $\mathtt{w}$ iff the antecedent-worlds most similar to $\mathtt{w}$ are all consequent-worlds.

$$\phi \mathrel{\Box\!\!\rightarrow} \psi \text{ is true at } \mathtt{w} \text{ iff } \psi \text{ is true at every } \mathtt{w}' \in \mathtt{max}(\mathtt{w}, \phi).$$

The Classical Meaning of Conditionals

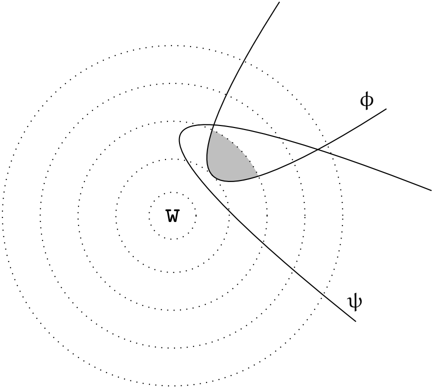

Figure: World where $\phi \mathrel{\Box\!\!\rightarrow} \psi$ is true

The Monotonicity of Conditionals II

- The closest ϕ-worlds may still be closer than any ϕ^+-worlds.

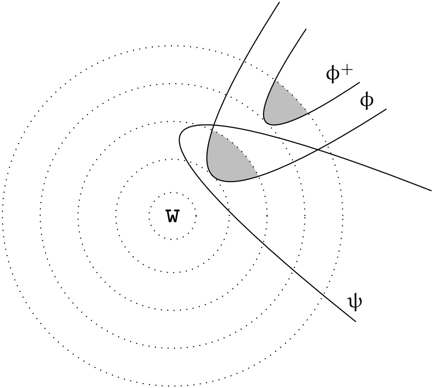

Figure: World where $\phi^+ \Box\!\!\rightarrow \psi$ is false

Failure of Antecedent Strengthening

- CS does not validate Antecedent Strengthening.

Failure of Antecedent Strengthening (FAS):
$\phi \mathrel{\Box\!\!\rightarrow} \psi \nvDash \phi^{+} \mathrel{\Box\!\!\rightarrow} \psi$

Any and the Classical Semantics

The Licensing of *Any*

- I assume for *any* the basic meaning of an existential quantifier, restricted by a domain $\mathtt{D}$.

$$[\![\mathrm{any}_{\mathtt{D}}]\!] := \lambda \mathtt{P} \lambda \mathtt{Q}.\ \exists \mathtt{x} \in \mathtt{D} : (\mathtt{P}(\mathtt{x}) \wedge \mathtt{Q}(\mathtt{x}))$$

- *Any* is licensed whenever widening its domain strengthens the meaning of the sentence containing it (Kadmon & Landman, 1993).

Any Licensing Condition 1 (ALC-1) :
$\mathrm{any}_{\mathtt{D}}$ is licensed in sentence $\mathtt{S}[\mathrm{any}_{\mathtt{D}}]$ only if
$\forall \mathtt{D}^{+} \subseteq \mathtt{D} : [\![\mathtt{S}[\mathrm{any}_{\mathtt{D}}]]\!] \vDash [\![\mathtt{S}[\mathrm{any}_{\mathtt{D}^{+}}]]\!]$.

Any in simple Positive Sentences

- If $\mathtt{D}^+ \subseteq \mathtt{D}$, a simple existential statement restricted to $\mathtt{D}^+$ implies the same statement restricted to $\mathtt{D}$.

$$\exists \mathtt{x} \in \mathtt{D}^+ : (\mathtt{P}(\mathtt{x}) \wedge \mathtt{Q}(\mathtt{x})) \vDash \exists \mathtt{x} \in \mathtt{D} : (\mathtt{P}(\mathtt{x}) \wedge \mathtt{Q}(\mathtt{x}))$$

- A simple positive sentence with $\textit{any}_{\mathtt{D}}$ is thus entailed by the same sentence with $\textit{any}_{\mathtt{D}^+}$.

$$[\![\mathtt{any}_{\mathtt{D}^+}]\!](\mathtt{P})(\mathtt{Q}) \vDash [\![\mathtt{any}_{\mathtt{D}}]\!](\mathtt{P})(\mathtt{Q})$$

CS and the ALC-1

- Because of FAS, a conditional with $any_{\mathtt{D}}$ in its antecedent won't entail the same sentence with $any_{\mathtt{D}^+}$.

$$[\![\text{any}_{\mathtt{D}}]\!](\mathtt{P})(\mathtt{Q}) \mathrel{\Box\!\!\rightarrow} \psi \not\models [\![\text{any}_{\mathtt{D}^+}]\!](\mathtt{P})(\mathtt{Q}) \mathrel{\Box\!\!\rightarrow} \psi$$

- **With CS+ALC-1, *any* should be ruled out in the antecedent of conditionals!**

von Fintel's Semantics

The Modal Horizon

- von Fintel's semantics for conditionals (FS) makes refrerence to a **modal horizon** $\mathtt{H_w}$ (von Fintel, 1999, 2001).
- It is a contextually determined domain of quantification for conditionals, restricted by $\succeq_{\mathtt{w}}$:

$$\forall \mathtt{w}' \in \mathtt{H_w}\ \forall \mathtt{w}'' \succeq_{\mathtt{w}} \mathtt{w}' : \mathtt{w}'' \in \mathtt{H_w}$$

The Modal Horizon

We can think of $\texttt{H}_\texttt{w}$ as a set punched out of Lewis' system of spheres, leaving out worlds too distant from $\texttt{w}$

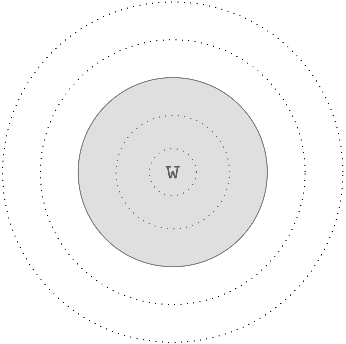

Figure: Example modal horizon

von Fintel's Semantics

- On FS, a conditional presupposes the existence of some antecedent-world in the modal horizon.

$$\phi > \psi \text{ is true or false at } \mathtt{w} \text{ only if } \phi \text{ is true at some } \mathtt{w}' \in \mathtt{H}_{\mathtt{w}}.$$

- When this presupposition is satisfied, a conditional's meaning is the same as on a strict analysis.

When true or false,

$$\phi > \psi \text{ is true at } \mathtt{w} \text{ iff } \phi \to \psi \text{ is true at every } \mathtt{w}' \in \mathtt{H}_{\mathtt{w}}$$

von Fintel's Semantics

If $\phi > \psi$ is true at w, $\phi^+ > \psi$ may have no truth-value at w.

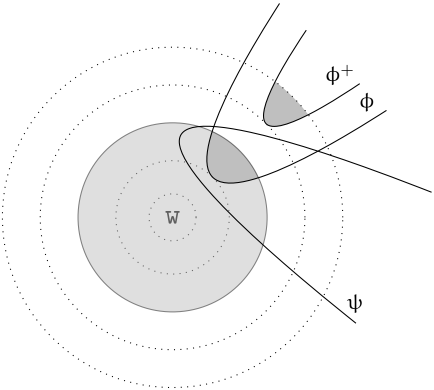

Figure: World where $\phi > \psi$ is true.

von Fintel's Semantics

But whenever both $\phi > \psi$ and $\phi^+ > \psi$ have a truth-value, the former's truth guarantees the latter's.

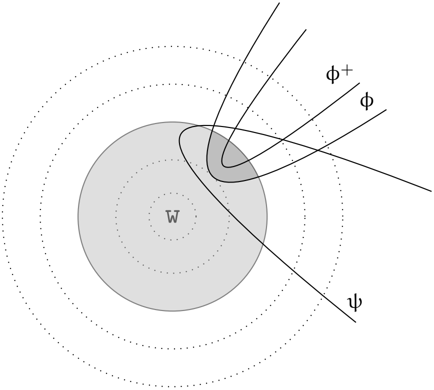

Figure: World where $\phi > \psi$ and $\phi^+ > \psi$ both have truth-values

Strawson Entailment

- This opens the discussion to a weaker notion of entailment: **Strawson entailment** (von Fintel, 1999, 2001; Strawson, 1952).

Strawson Entailment:
$\phi \vDash_s \psi$ iff $\phi \wedge S \vDash \psi$, where S states every presupposition of ψ.

- On FS, Antecedent Strengthening is valid on this weaker definition of entailment:

Weak Antecedent Strengthening (WAS) :
$\phi > \psi \vDash_s \phi^+ > \psi$

Any in the Antecedent of Conditionals

- von Fintel defines a new licensing condition for *any* that references Strawson entailment.

Any Licensing Condition 2 (ALC-2) :
$\text{any}_{\mathtt{D}}$ is licensed in sentence $\mathtt{S}[\text{any}_{\mathtt{D}}]$ only if
$\forall \mathtt{D}^{+} \subseteq \mathtt{D} : [\![\mathtt{S}[\text{any}_{\mathtt{D}}]]\!] \vDash_{\mathtt{s}} [\![\mathtt{S}[\text{any}_{\mathtt{D}^{+}}]]\!]$.

- **FS+ALC-2 predicts the licensing of *any* in the antecedent of contionals!**

Simplification and the Licensing of *Any*

From Disjunctions to Conjunctions

- We intuit the inferences in (3) as valid.

(3) If kangaroos lost their tails or feet, they would fall over.
$\rightsquigarrow$ If kangaroos lost their tails, they would fall over.
$\rightsquigarrow$ If kangaroos lost their feet, they would fall over.

From Indefinites to Conjunctions

- We drawn such inferences from indefinites as well (van Rooj, 2006).
- This includes idefinites such as *any*.

(4) If any kangaroo lost its tail, it would fall over.

$\rightsquigarrow$ for every kangaroo x : if x lost its tail, x would fall over,

Simplification of Disjunctive Antecedents

- Both kinds of inferences can be seen as an instance of **Simplification of Disjunctive Antecedents** (SDA)
- A narrow scope disjunction in the antecedent of a conditional is interpreted as a wide scope conjunction
- An existentially quantified statement is always equivalent to a disjunctive statement.

$$\exists \mathtt{x} \in \{\mathtt{a}, \mathtt{b}\} : \phi(\mathtt{x}) \equiv \phi(\mathtt{a}) \vee \phi(\mathtt{b})$$

Simplification of Disjunctive Antecedents

- Here, I show that SDA allows *any* to be licensed on CS+ALC-1.
- I do so by assuming the proposal to derive SDA in Bar-Lev & Fox (2020), which I will now discuss.

SDA as an Implicature

- SDA is semantically incompatible with the classical semantics.
- It is often treated as an implicature, derived from comparing the meaning of a conditional with that of its alternatives.
- The alternatives I assumed for a sentence with *any* are its **subdomain alternatives** (Chierchia, 2013):

$$\texttt{Alt}(\texttt{S}[\text{any}_{\texttt{D}}]) \coloneqq \{[\![\texttt{S}[\text{any}_{\texttt{D}^+}]]\!] \mid \texttt{D}^+ \subseteq \texttt{D}\}$$

Alternatives of a Conditional

- Below are (shorthands for) the alternatives of a conditional with $any_{\{\mathtt{a},\mathtt{b}\}}$ in the antecedent.
- These are all logically independent.

$$\mathtt{a} \vee \mathtt{b} \;\Box\!\!\rightarrow \psi$$

$$\mathtt{a} \;\Box\!\!\rightarrow \psi \qquad\qquad \mathtt{b} \;\Box\!\!\rightarrow \psi$$

Figure: Subdomain alternatives of $\mathtt{a} \vee \mathtt{b} \;\Box\!\!\rightarrow \psi$

Innocent Exclusion

- Implicatures are commonly assumed to be drawn with reference to a sentence's innocently excludable (IE) alternatives (Fox, 2007).

$$\mathtt{IE}(\phi, \mathtt{A}) := \bigcap \left\{ \mathtt{B} \;\middle|\; \begin{array}{l} \mathtt{B} \text{ is a maximal subset of } \mathtt{A} \text{ s.t.} \\ \phi \wedge \bigwedge_{\psi \in \mathtt{B}} \neg\psi \not\equiv \bot \end{array} \right\}$$

Innocent Exclusion

- The set of IE alternatives is empty: $\bigcap\{\texttt{max1}, \texttt{max2}\} = \emptyset$

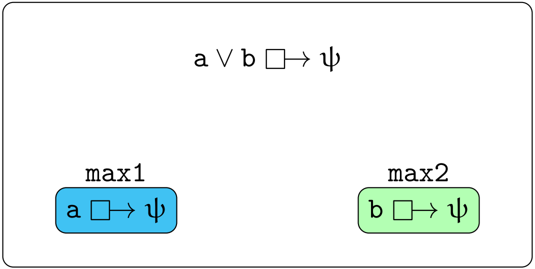

Figure: Innocently Excludable Alternatives

Innocent Inclusion

- BF also assume that so called **innocently includable** (II) alternatives play a role in deriving a sentence's implicatures.

$$\mathtt{II}(\phi, \mathtt{A}) := \bigcap \left\{ \mathtt{B} \;\middle|\; \begin{array}{l} \mathtt{B} \text{ is a maximal subset of } \mathtt{A} \text{ s.t.} \\ \phi \wedge \bigwedge_{\psi \in \mathtt{B}} \psi \wedge \bigwedge_{\chi \in \mathtt{IE}(\phi, \mathtt{A})} \neg\chi \not\equiv \bot \end{array} \right\}$$

Innocent Inclusion

- Since there are no IE alternatives, all of the alternatives can be asserted without contradicting them.
- All the alternatives are thus II: $\bigcap\{\mathtt{max1}\} = \mathtt{max1}$.

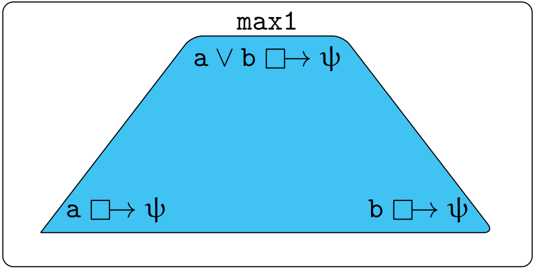

Figure: Innocently Includable Alternatives

Deriving SDA

- BF derive SDA from conditionals by asserting all of their II alternatives.

$$\mathtt{exh}^{\mathtt{II}}_{\mathtt{A}}(\phi) := \phi \wedge \bigwedge_{\psi \in \mathtt{II}(\phi, \mathtt{A})} \psi$$

- With $\mathtt{C}$ as the subdomain alternatives of $\mathtt{a} \vee \mathtt{b} \mathrel{\Box\!\!\rightarrow} \psi$, we indeed get SDA:

$$\begin{aligned}\mathtt{exh}^{\mathtt{II}}_{\mathtt{C}}(\mathtt{a} \vee \mathtt{b} \mathrel{\Box\!\!\rightarrow} \psi) &= (\mathtt{a} \vee \mathtt{b} \mathrel{\Box\!\!\rightarrow} \psi) \wedge (\mathtt{a} \mathrel{\Box\!\!\rightarrow} \psi) \wedge (\mathtt{b} \mathrel{\Box\!\!\rightarrow} \psi) \\ &= (\mathtt{a} \mathrel{\Box\!\!\rightarrow} \psi) \wedge (\mathtt{b} \mathrel{\Box\!\!\rightarrow} \psi)\end{aligned}$$

SDA and Entailment among Alternatives

- With CS+SDA, a conditional with $any_{\mathtt{D}}$ entail any conditional with $any_{\mathtt{D+}}$:

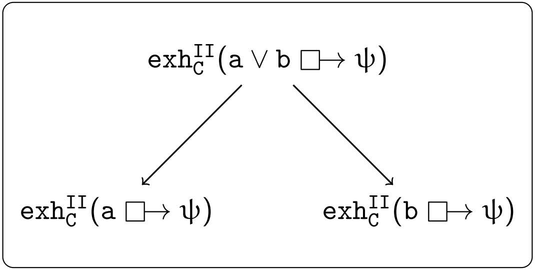

Figure: Entailment after SDA

SDA and Entailment among Alternatives

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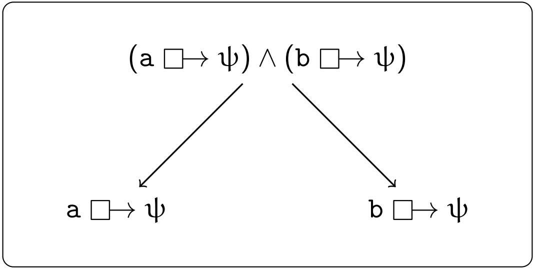

Figure: Entailment after SDA

- **Given SDA, we expect *any* to be licensed in the antecedent of conditionals on CS+ALC-1!**

Question

- What motivation does the licensing of *any* in conditionals now provide to FS+ALC-2?

Any with a Plural Restrictor

Any with a Plural Restrictor

- We have restricted our attention to [any NP_{SG}].
- Drawing on Crnič (2022), I look at [any NP_{PL}].
- SDA, as derived by BF, won't license [any NP_{PL}] on CS+ALC-1.

Any with a Plural Restrictor

- [any NP_{PL}] is acceptable in the antecedent of conditionals

(5) If any kangaroos lost their tails, they would fall over

Eliminating Disjuncts

- Note the following equivalence:

$$\exists \mathtt{x} \in \{\mathtt{a}, \mathtt{b}, \mathtt{a} \oplus \mathtt{b}\} : \phi(\mathtt{x}) \equiv \phi(\mathtt{a}) \vee \phi(\mathtt{b}) \vee \phi(\mathtt{a} \oplus \mathtt{b})$$

- If ϕ is distributive, the following is also equivalent:

$$\phi(\mathtt{a}) \vee \phi(\mathtt{b}) \vee \phi(\mathtt{a} \oplus \mathtt{b}) \equiv \phi(\mathtt{a}) \vee \phi(\mathtt{b})$$

If any Kangaroos Lost their Tails...

- The predicate of kangaroos who lost their tails is distributive.

$$[\![\text{any}_{\{\mathtt{a},\mathtt{b},\mathtt{a}\oplus\mathtt{b}\}}]\!](\mathtt{K})(\mathtt{L}) = \phi(\mathtt{a}) \vee \phi(\mathtt{b})$$

- The basic meaning of the conditional with it as its antecedent is thus:

$$\mathtt{a} \vee \mathtt{b} \mathrel{\Box\!\!\rightarrow} \psi$$

Alternatives with the Plural

- We get for this conditional the subdomain alternatives below.
- Here, $\phi(\mathtt{a} \oplus \mathtt{b}) \equiv \phi(\mathtt{a}) \wedge \phi(\mathtt{b})$

$$\mathtt{a} \vee \mathtt{b} \mathrel{\Box\!\!\rightarrow} \psi$$

$$\mathtt{a} \mathrel{\Box\!\!\rightarrow} \psi \qquad\qquad \mathtt{b} \mathrel{\Box\!\!\rightarrow} \psi$$

$$\mathtt{a} \wedge \mathtt{b} \mathrel{\Box\!\!\rightarrow} \psi$$

Figure: Alternatives in the Conditional

Innocently Excludable Alternatives

- The IE alternatives are $\bigcap\{\texttt{max1}, \texttt{max2}\} = \{\mathsf{a} \wedge \mathsf{b} \mathrel{\Box\!\!\rightarrow} \psi\}$.

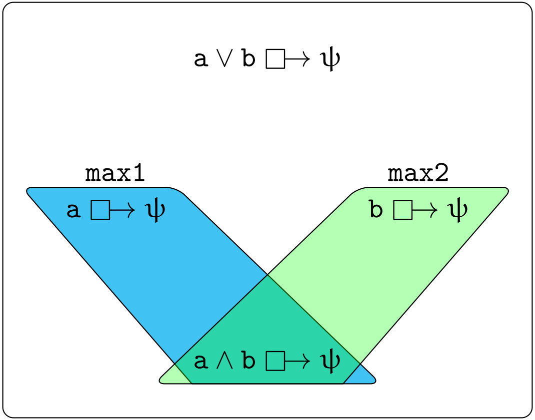

Figure: Innocently excludable alternatives

Innocently Includable Alternatives

- The II alternatives are $\bigcap\{\texttt{max1}\} = \texttt{max1}$.

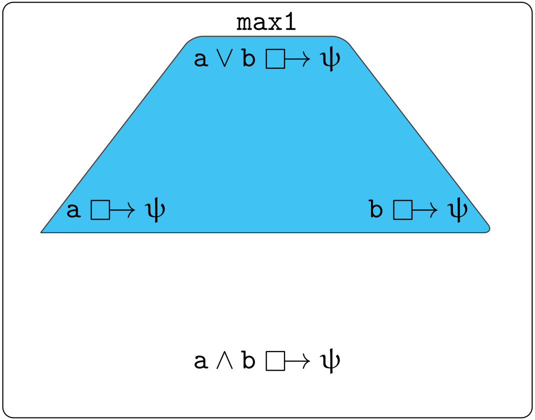

Figure: Innocently includable alternatives

- **We do not have the conditional entailing all of its subdomain alternatives!**

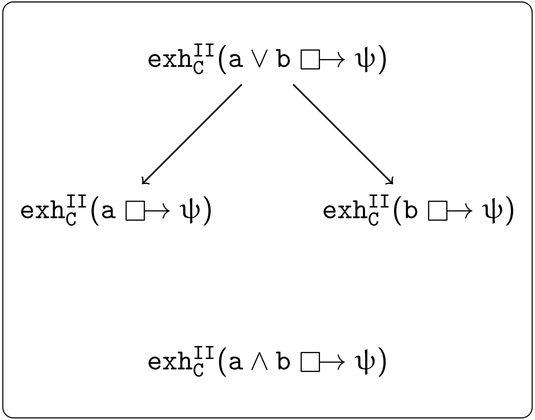

Figure: Entailments after simplification

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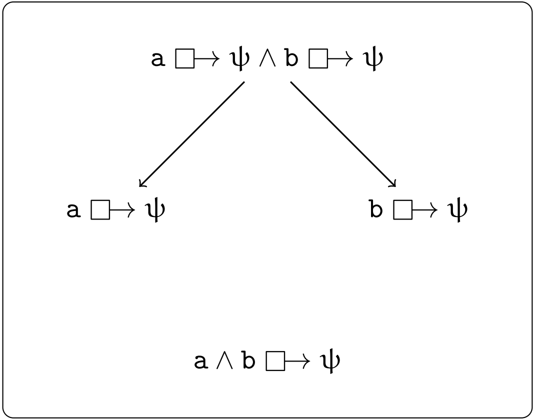

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Lack of Classical Entailment

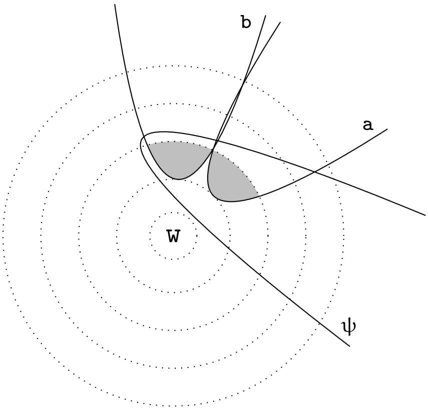

Figure: World where a ∧ b □→ ψ is false

New Failure for the Classical Semantics

- **On BF's treatment of SDA, CS+ALC-1 predicts [any NP_{PL}] to be unacceptable in the antecedent of conditionals!**

Plural Restrictors in von Fintel's Analysis

von Fintel and Simplification

- The subdomain alternatives of conditionals on von Fintel's semantics are (essentially) the same.
- Exhaustification picks out the same IE and II alternatives

Simplification and Strawson Entailment

- **After simplification, we have the simplified conditional Strawson entailing all of its subdomain alternatives!**

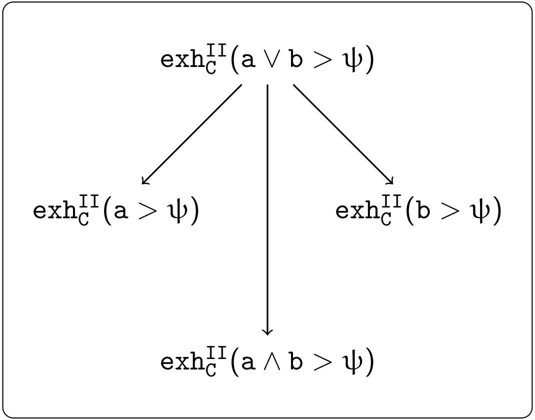

Figure: Strawson entailment between simplified conditionals

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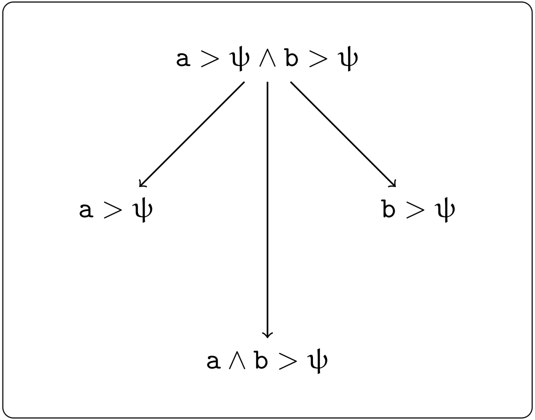

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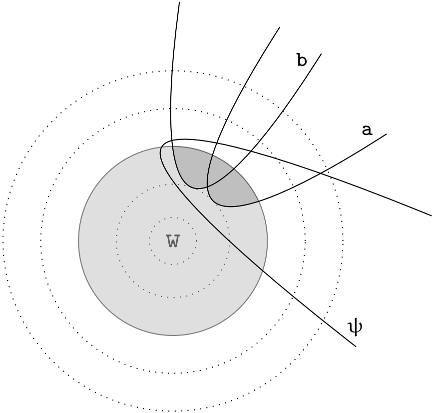

Figure: World where $\mathtt{a} \wedge \mathtt{b} > \psi$ has a truth-value

A Win for von Fintel's Semantics

- **On FS+ALC-2, SDA with [any NP_{PL}] is expected to license the NPI!**

Concluding Remarks

Summary

- On BF's assumptions, SDA can license [any NP_{SG}] in the antecedent of conditionals with CS+ALC-1
- However, BF predict SDA to not license [any NP_{PL}] on CS+ALC-1
- FS+ALC-2, however, can license it with SDA (and without)

Take Home Message

- If we assume the derivation of SDA offered in BF, von Fintel's argument from *any* preserves its bite
- However, the strength of this argument now rests on the strength of the arguments in favor of BF.
- If we reject BF, we may lose the argument in favor of FS+ALC-2.

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