Counterfactual Donkeys *Don't* Get High

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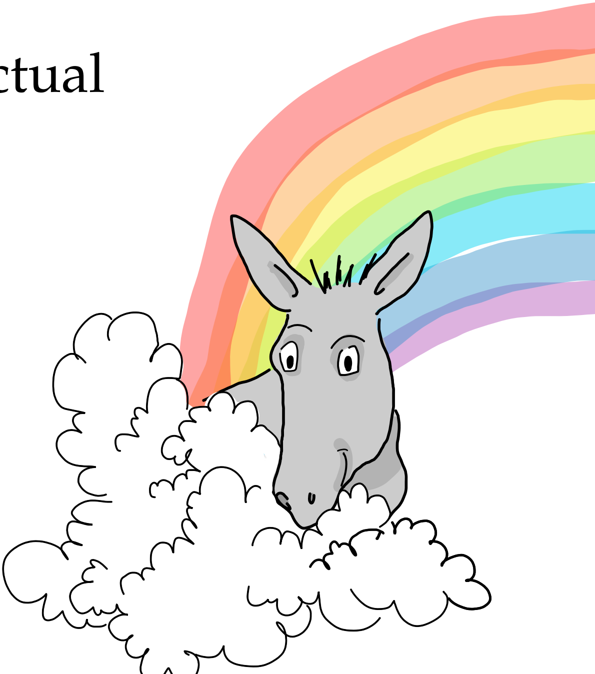

New Data

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New Data - Summary

(1) *Allie*: If Mary had made a vase, she would have made it from glass.

(2) *Bert*: But she could have made a clay vase (and she wouldn't have made *that* from glass)!

Case 1: Mary made two glass vases.

Case 2: Mary did not make any vases.

	Case 1	Case 2
(1)	✓	✗
(2)	??	✓

So what?

Old Data

(3) If Balaam owned a donkey, he would beat it.

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Apparent entailments:

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Apparent entailments:

(4) a. If Herbert were a donkey Balaam owned, Balaam would beat Herbert.
    b. If Eeyore were a donkey Balaam owned, Balaam would beat Eeyore.
    c. If Platero were a donkey Balaam owned, Balaam would beat Platero.

Old Data - Two Accounts

Two routes to accounting for universal entailments:

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   (van Rooij (2006), Walker and Romero (2015))

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We should take Route 1.

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The special ordering-based accounts predict the new data.

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High reading accounts don't.

In other words…

Counterfactual donkeys

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Counterfactual donkeys don't get high.

Overview

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Ordering Semantics + Dynamic Binding

Familiar Stalnaker-Lewis style semantics.

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Selection function:

(5) $f(A, w) = \{w' : w \in [\![A]\!] \wedge \neg\exists w''(w'' \in [\![A]\!] \wedge w'' <_w w')\}$

The A-worlds nearest to w, according to $<_w$.

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The A-worlds nearest to w, according to $<_w$.

(6) $[\![A \mathrel{\Box\!\!\rightarrow} C]\!] = \{w : \forall w'(w' \in f(A, w) \supset w \in [\![C]\!])\}$

C is true at all the nearest A-worlds.

DPL with possible worlds (based on Groenendijk and Stokhof (1991) and Groenendijk, Stokhof, and Veltman (1996))

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(7) a. $s[F(x)] = \{i : i \in s \wedge w_i \in [\![F(g_i(x))]\!]\}$
b. $s[\exists x] = \{i : \exists j \exists d(j \in s \wedge d \in \mathcal{D} \wedge w_i = w_j \wedge g_i = g_j^{x \to d})\}$

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j is an A-possibility for i (or $j \in /A/_i$) iff $\exists k(g_k = g_i \wedge j \in \{k\}[A])$.

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Finds the nearest A-possibility, where possibilities are ordered by their worlds.

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Finds the nearest A-possibility, where possibilities are ordered by their worlds.

(9) $s[A \mathrel{\Box\!\!\rightarrow} C] = \{i : i \in s \wedge \forall j(j \in f(A, i) \supset \{j\}[C] \neq \emptyset)\}$

C is verified by all selected possibilities

Ordering Semantics + Dynamic Binding

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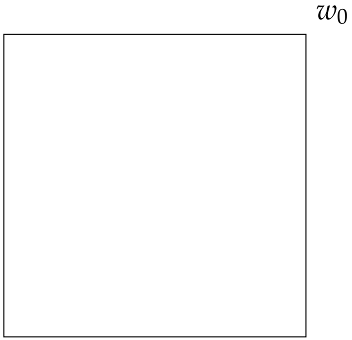
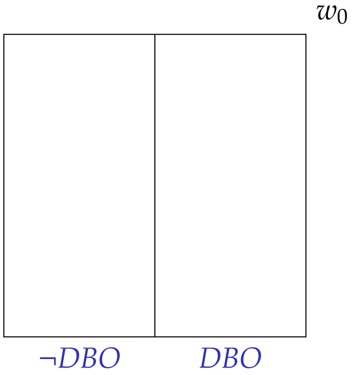
(10) $\exists x DBO(x) \mathrel{\Box\!\!\rightarrow} BB(x)$

Dynamic Binding + Ordering Semantics

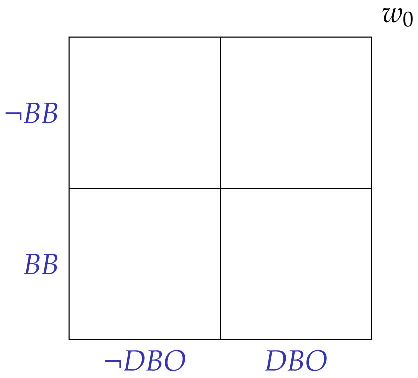


Dynamic Binding + Ordering Semantics



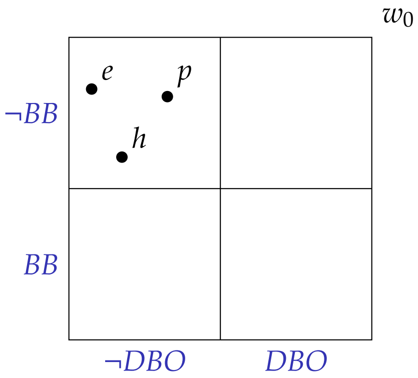
DBO = donkey that Balaam owns

Dynamic Binding + Ordering Semantics

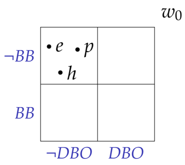


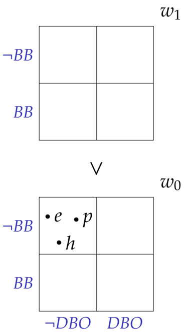
DBO = donkey that Balaam owns
BB = thing that Balaam beats

Dynamic Binding + Ordering Semantics



DBO = donkey that Balaam owns
BB = thing that Balaam beats
e = Eeyore
h = Herbert
p = Platero


w_0
$\neg BB$
BB
$\bullet e$
$\bullet p$
$\bullet h$
$\neg DBO$
DBO


w_1
$\neg BB$
BB
$\vee$
w_0
e
p
h
$\neg BB$
BB
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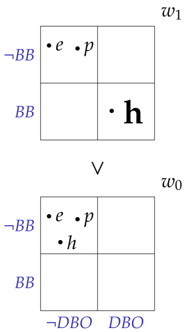
DBO



w_1
$\neg BB$
BB
$\bullet e$
$\bullet p$
$\bullet\ \mathbf{h}$
$\vee$
w_0
$\neg BB$
BB
$\bullet e$
$\bullet p$
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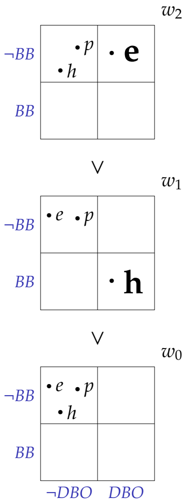
DBO


w_2
$\neg BB$
BB
p
h
e
w_1
$\neg BB$
BB
e
p
h
w_0
$\neg BB$
BB
e
p
h
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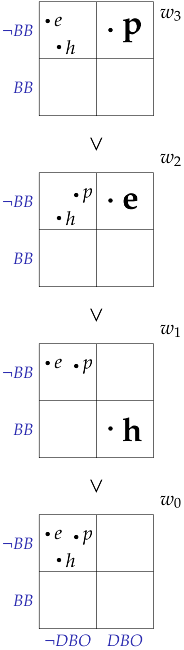
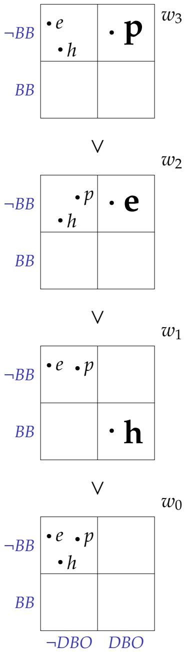
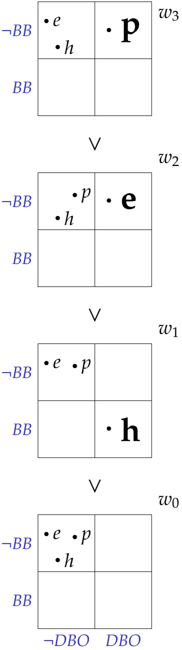
DBO



w3
¬BB
BB
e
h
p
w2
p
h
e
w1
e
p
h
w0
e
p
h
¬DBO
DBO



$\langle w_0, g^{x\to h}\rangle$ $\langle w_0, g^{x\to e}\rangle$ $\langle w_0, g^{x\to p}\rangle$

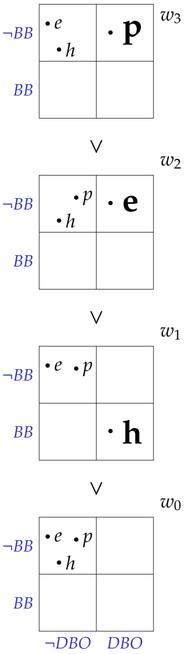


$\langle w_3, g^{x\to h}\rangle \qquad \langle w_3, g^{x\to e}\rangle \qquad \langle w_3, g^{x\to p}\rangle$

$\langle w_2, g^{x\to h}\rangle \qquad \langle w_2, g^{x\to e}\rangle \qquad \langle w_2, g^{x\to p}\rangle$

$\langle w_1, g^{x\to h}\rangle \qquad \langle w_1, g^{x\to e}\rangle \qquad \langle w_1, g^{x\to p}\rangle$

$\langle w_0, g^{x\to h}\rangle \qquad \langle w_0, g^{x\to e}\rangle \qquad \langle w_0, g^{x\to p}\rangle$



$$\langle w_3, g^{x\to h}\rangle \quad = \quad \langle w_3, g^{x\to e}\rangle \quad = \quad \langle w_3, g^{x\to p}\rangle$$

$$\langle w_2, g^{x\to h}\rangle \quad = \quad \langle w_2, g^{x\to e}\rangle \quad = \quad \langle w_2, g^{x\to p}\rangle$$

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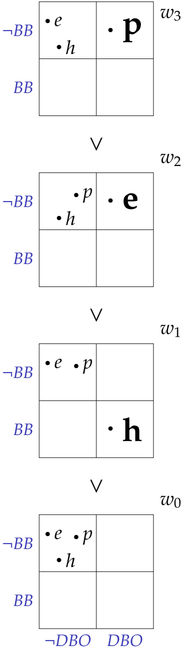

$$\langle w_3, g^{x\to h}\rangle = \langle w_3, g^{x\to e}\rangle = \langle w_3, g^{x\to p}\rangle$$

$$\vee$$

$$\langle w_2, g^{x\to h}\rangle = \langle w_2, g^{x\to e}\rangle = \langle w_2, g^{x\to p}\rangle$$

$$\vee$$

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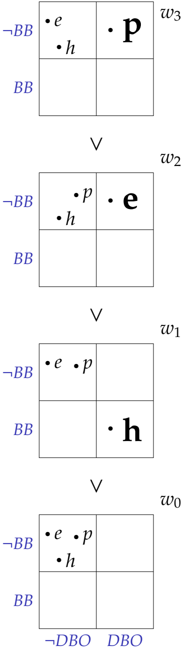

$$
\begin{array}{ccccc}
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 & & \vee & & \\
\langle w_2, g^{x\to h}\rangle & = & \langle w_2, g^{x\to e}\rangle & = & \langle w_2, g^{x\to p}\rangle \\
 & & \vee & & \\
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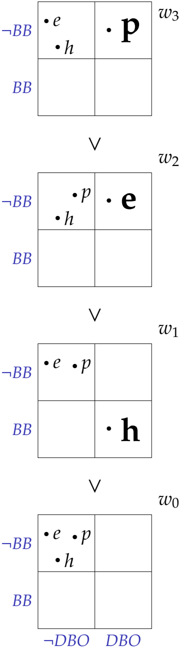
\end{array}
$$



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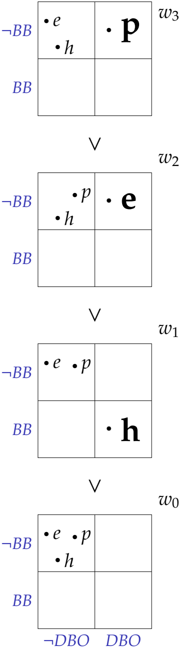

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 & & \vee & & \\
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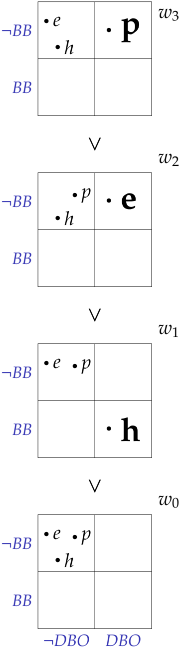
\end{array}
$$



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 & & \vee & & \\
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 & & \vee & & \\
\boxed{\langle w_1, g^{x\to h}\rangle} & = & \langle w_1, g^{x\to e}\rangle & = & \langle w_1, g^{x\to p}\rangle \\
 & & \vee & & \\
\langle w_0, g^{x\to h}\rangle & = & \langle w_0, g^{x\to e}\rangle & = & \langle w_0, g^{x\to p}\rangle
\end{array}
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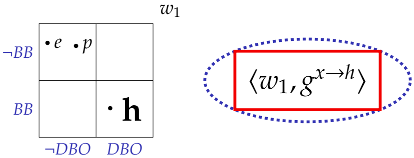
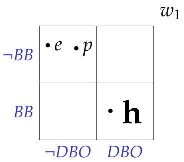


w_1
$\bullet e$ $\bullet p$
$\neg BB$
BB
$\cdot\ \mathbf{h}$
$\neg DBO$ DBO
$\langle w_1, g^{x\to h}\rangle$

$$\exists x DBO(x) \;\square\!\!\rightarrow\; BB(x)$$



$$\boxed{\langle w_1, g^{x\rightarrow h}\rangle}$$

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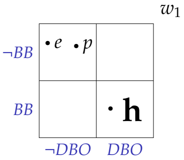

$$\boxed{\langle w_1, g^{x \rightarrow h} \rangle}$$

$$\forall j (j \in f(A, i) \{j\}[BB(x)] \neq \emptyset$$

$$\exists x DBO(x) \;\Box\!\!\rightarrow\; BB(x)$$

w_1

	$\neg DBO$	DBO
$\neg BB$	$\bullet\, e \quad \bullet\, p$	
BB		$\cdot\, \mathbf{h}$

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$$\forall j (j \in f(A, i) \{j\}[BB(x)] \neq \emptyset$$

$$\{\langle w_1, g^{x \rightarrow h} \rangle\}[BB(x)]$$

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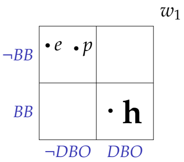

$$\boxed{\langle w_1, g^{x \rightarrow h} \rangle}$$

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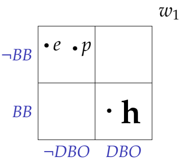
$$\{\langle w_1, g^{x \rightarrow h} \rangle\}[BB(x)]$$

$$w_1 \in [\![BB(h)]\!]?$$

$$\exists x DBO(x) \;\Box\!\!\rightarrow\; BB(x)$$



$$\boxed{\langle w_1, g^{x\rightarrow h}\rangle}$$

$$\forall j (j \in f(A, i)\{j\}[BB(x)] \neq \emptyset$$

$$\{\langle w_1, g^{x\rightarrow h}\rangle\}[BB(x)]$$

$$w_1 \in [\![BB(h)]\!]? \checkmark$$

$$\exists x DBO(x) \;\Box\!\!\rightarrow\; BB(x)$$

w_1

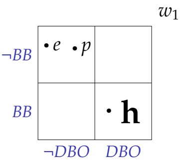
$\neg BB$	$\bullet e \quad \bullet p$	
BB		$\cdot\ \mathbf{h}$
	$\neg DBO$	DBO

$$\boxed{\langle w_1, g^{x\rightarrow h}\rangle} \qquad \forall j(j \in f(A,i)\{j\}[BB(x)] \neq \emptyset$$

$$\{\langle w_1, g^{x\rightarrow h}\rangle\}[BB(x)] = \{\langle w_1, g^{x\rightarrow h}\rangle\} \neq \emptyset$$

$w_1 \in [\![BB(h)]\!]$? ✓

$$\exists x DBO(x) \mathrel{\Box\!\!\rightarrow} BB(x) \checkmark$$



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Ordering Semantics + Dynamic Binding

Problem: no universal entailments

Ordering Semantics + Dynamic Binding

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(11) If Balaam owned a donkey, he would beat it.

(12)
a. If Herbert were a donkey Balaam owned, Balaam would beat Herbert.
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Ordering Semantics + Dynamic Binding

Problem: no universal entailments

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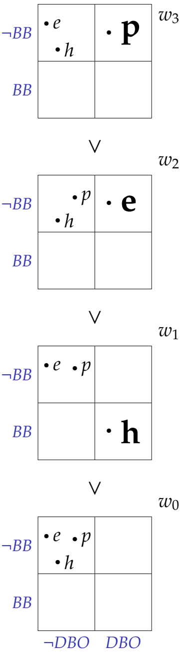
Ordering Semantics + Dynamic Binding

(12-b) If Eeyore were a donkey Balaam owned, Balaam would beat Eeyore.

(13) $DBO(e) \mathrel{\Box\!\!\rightarrow} BB(e)$



$$\langle w_3, g^{x\to h}\rangle = \langle w_3, g^{x\to e}\rangle = \langle w_3, g^{x\to p}\rangle$$

$$\vee$$

$$\langle w_2, g^{x\to h}\rangle = \langle w_2, g^{x\to e}\rangle = \langle w_2, g^{x\to p}\rangle$$

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$$\langle w_1, g^{x\to h}\rangle = \langle w_1, g^{x\to e}\rangle = \langle w_1, g^{x\to p}\rangle$$

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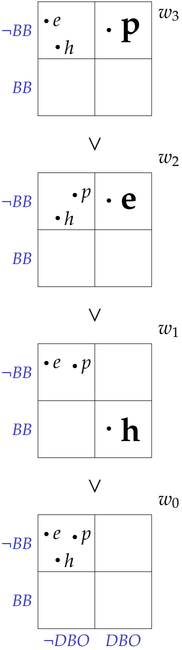
$$\langle w_0, g^{x\to h}\rangle = \langle w_0, g^{x\to e}\rangle = \langle w_0, g^{x\to p}\rangle$$



$$\langle w_3, g^{x\to h}\rangle = \langle w_3, g^{x\to e}\rangle = \langle w_3, g^{x\to p}\rangle$$

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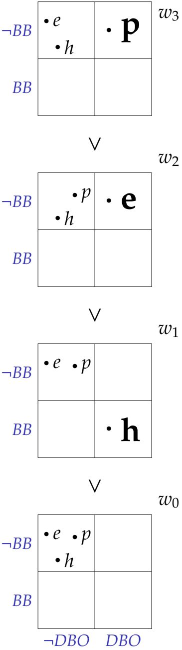

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$$\boxed{\langle w_2, g^{x\to h}\rangle} \quad = \quad \boxed{\langle w_2, g^{x\to e}\rangle} \quad = \quad \boxed{\langle w_2, g^{x\to p}\rangle}$$

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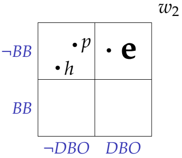

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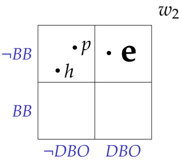

$$DBO(e) \mathrel{\Box\!\!\rightarrow} BB(e)$$

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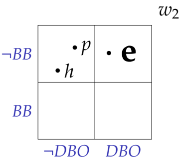

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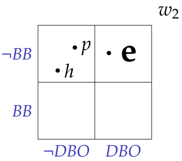
$$\forall j (j \in f(A,i)\{j\}[BB(e)] \neq \emptyset$$



$$DBO(e) \mathrel{\square\!\!\rightarrow} BB(e)$$

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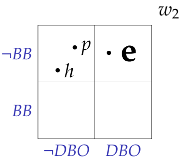
$$\forall j (j \in f(A, i)\{j\}[BB(e)] \neq \emptyset$$

$$w_2 \in [\![BB(e)]\!]?$$



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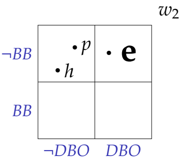
$$DBO(e) \;\Box\!\!\rightarrow\; BB(e) \text{ ✗}$$



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Ordering Semantics + Dynamic Binding

Problem: no universal entailments

(14) If Balaam owned a donkey, he would beat it.

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How to fix this?

Route 1: special orderings

Route 2: high readings

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Walker and Romero (2015): universal entailments would follow from $A \mathrel{\Box\!\!\rightarrow} C$ iff the closeness ordering were such that

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for any $a, b \in \mathcal{D}$, the closest world which combines with $g^{x \to a}$ to form an A-possibility is as close as the closest world which combines with $g^{x \to b}$ to form an A-possibility.

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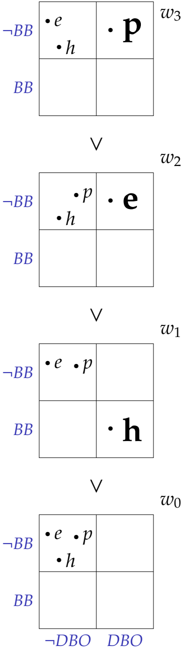
for any $a, b \in \mathcal{D}$, the closest world which combines with $g^{x \to a}$ to form an A-possibility is as close as the closest world which combines with $g^{x \to b}$ to form an A-possibility.

An ordering set $\mathcal{S}$ is *special* relative to a state s and sentence A

iff

(16) $\forall i(i \in s \supset \forall j(j \in /A/_i \supset \exists k(k \in f(A, i) \wedge g_j = g_k)))$

For all possibilities i in s, if j is an A-possibility for i, then among the nearest (relative to i) A-possibilities is a possibility which shares an assigment with j.



w3
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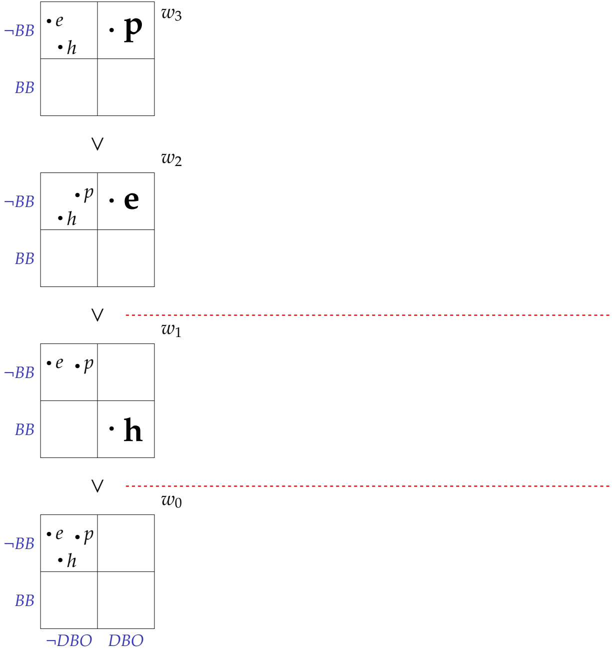

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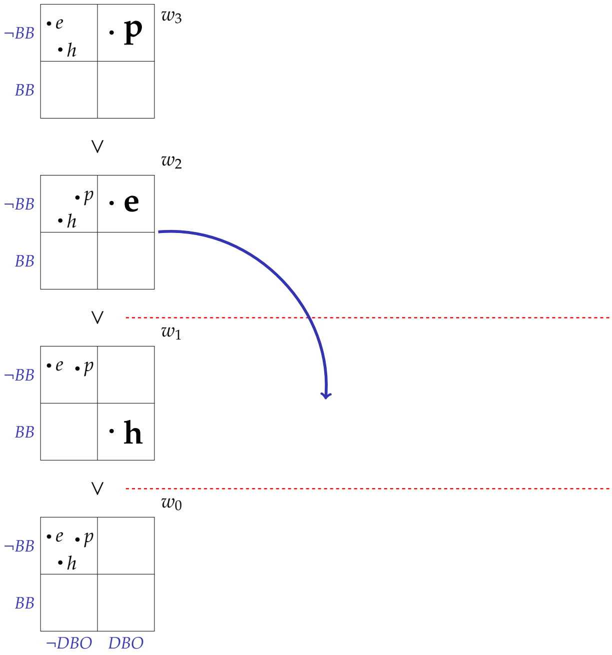
w_3
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$\bullet h$
$\bullet\ \mathbf{p}$
$\vee$
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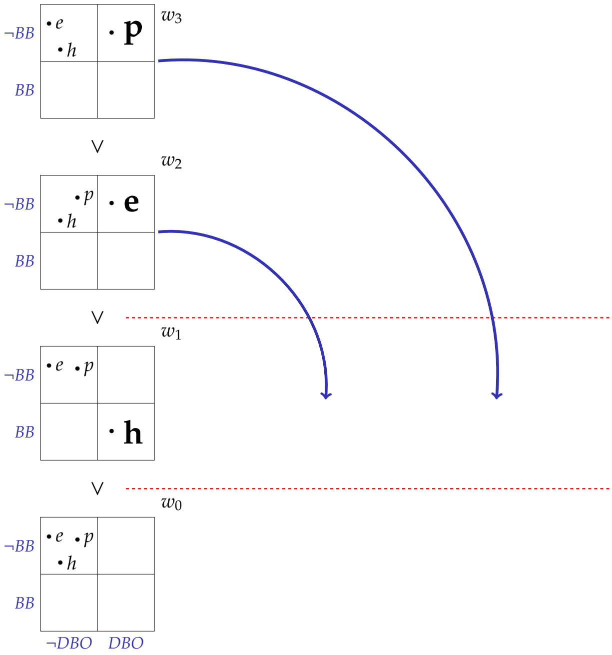
BB
$\bullet p$
$\bullet h$
$\bullet\ \mathbf{e}$
$\vee$
w_1
$\neg BB$
BB
$\bullet e$ $\bullet p$
$\bullet\ \mathbf{h}$
$\vee$
w_0
$\neg BB$
BB
$\bullet e$ $\bullet p$
$\bullet h$
$\neg DBO$ DBO


w_3
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BB
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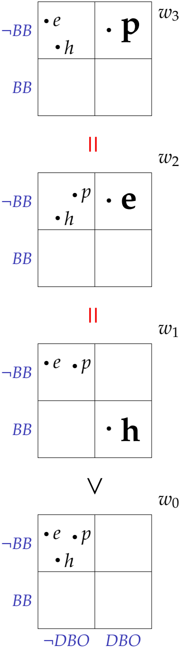
BB
$\neg DBO$ DBO



$$\begin{array}{ccccc}
\langle w_3, g^{x\to h}\rangle & = & \langle w_3, g^{x\to e}\rangle & = & \langle w_3, g^{x\to p}\rangle \\
 & & \shortparallel & & \\
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 & & \vee & & \\
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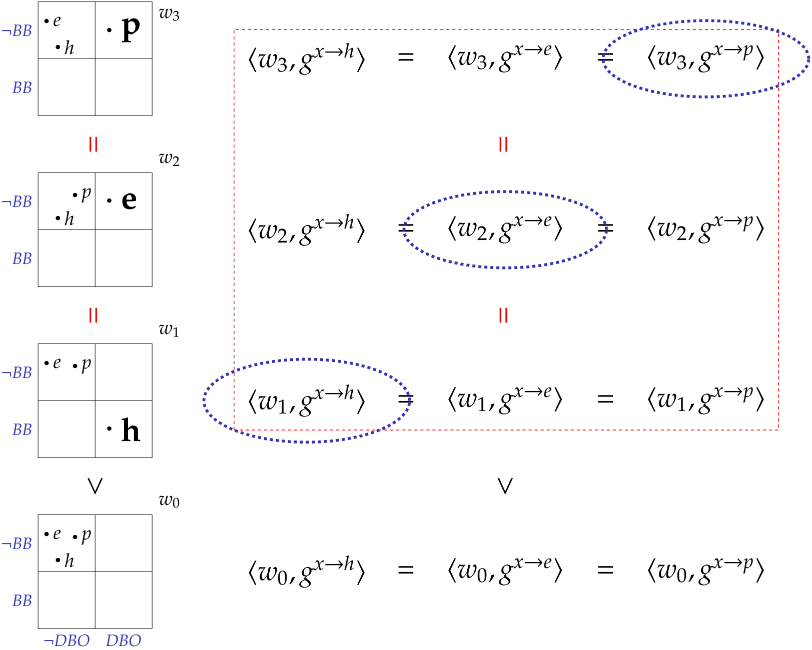
\end{array}$$



w_3
$\neg BB$
BB
$\bullet\, e$ $\bullet\, h$ $\cdot\, \mathbf{p}$
w_2
$\bullet\, p$ $\bullet\, h$ $\cdot\, \mathbf{e}$
w_1
$\bullet\, e$ $\bullet\, p$ $\cdot\, \mathbf{h}$
w_0
$\bullet\, e$ $\bullet\, p$ $\bullet\, h$
$\neg DBO$ DBO
$\langle w_3, g^{x\to h}\rangle = \langle w_3, g^{x\to e}\rangle = \langle w_3, g^{x\to p}\rangle$
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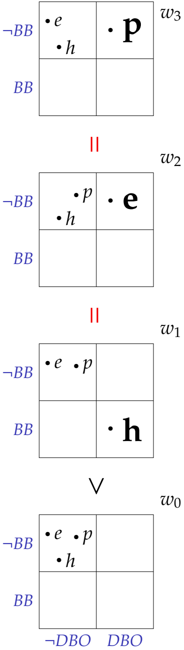

$$
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 & & > & & \\
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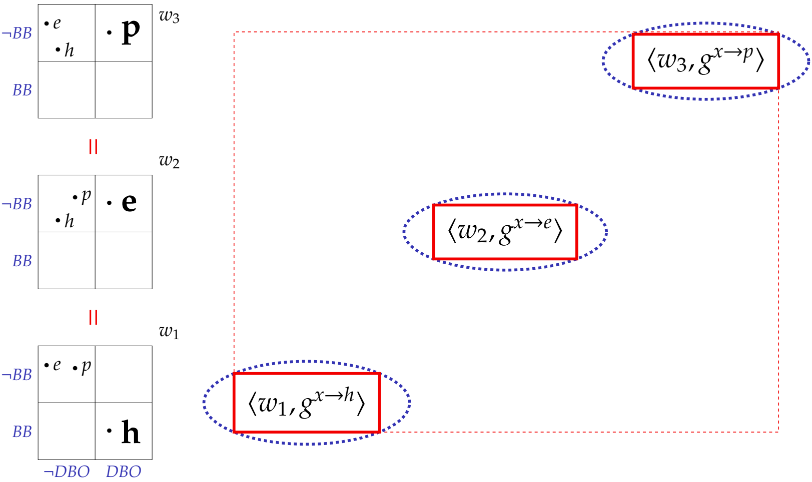
\end{array}
$$



w_3
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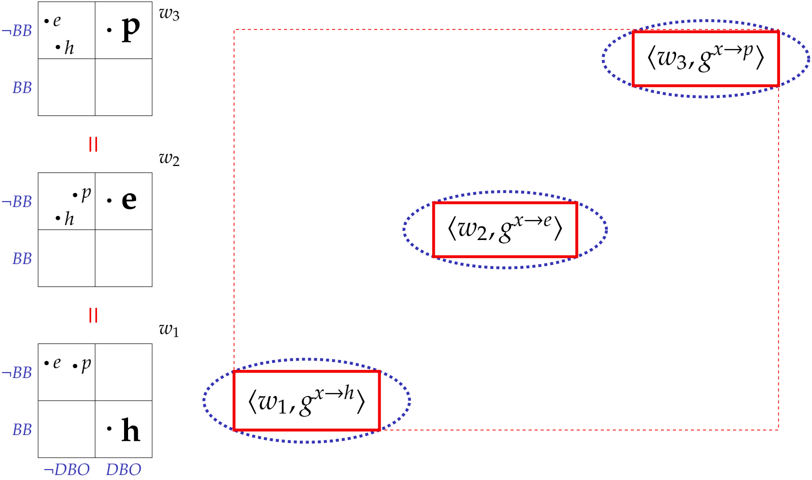
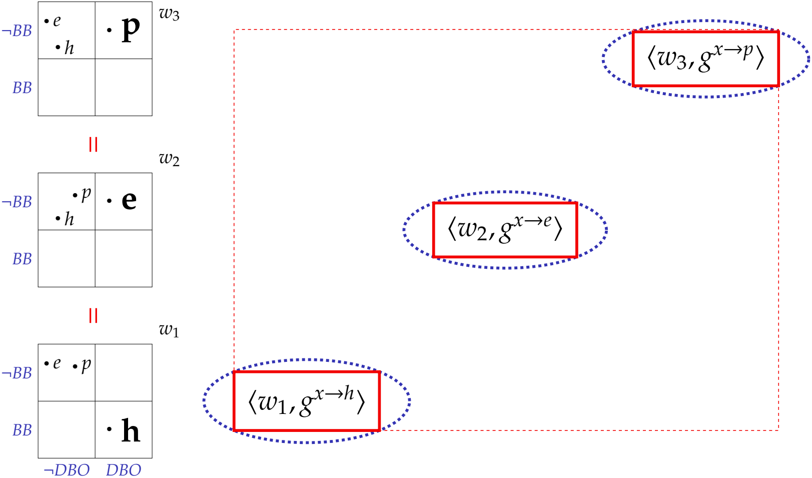


$$\exists x DBO(x) \mathrel{\Box\!\!\rightarrow} BB(x)$$



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Route 2: High Readings

Leave world ordering $\leq$ alone,

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Leave world ordering $\leq$ alone, but define an assignment-sensitive similarity ordering $\leq^*$ based on it.

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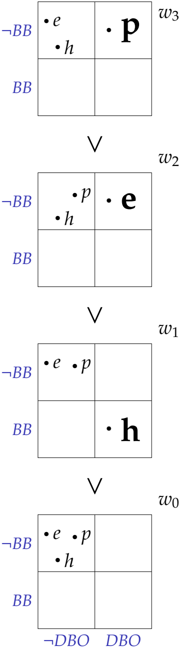
(17) $j \leq^*_i k$ iff $w_j \leq_{w_i} w_k \wedge g_j = g_k$

(18) $f^*(A, i) = \{j : j \in /A/_i \wedge \neg\exists k(k \in /A/_i \wedge k <^*_{w_i} j)\}$.

(19) $s[A \mathrel{\Box\!\!\rightarrow} C] = \{i : i \in s \wedge \forall j(j \in f^*(A, i) \supset \{j\}[C] \neq \emptyset)\}$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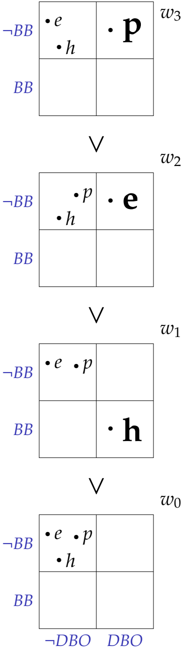

$\langle w_3, g^{x\to h}\rangle$	$\langle w_3, g^{x\to e}\rangle$	$\langle w_3, g^{x\to p}\rangle$
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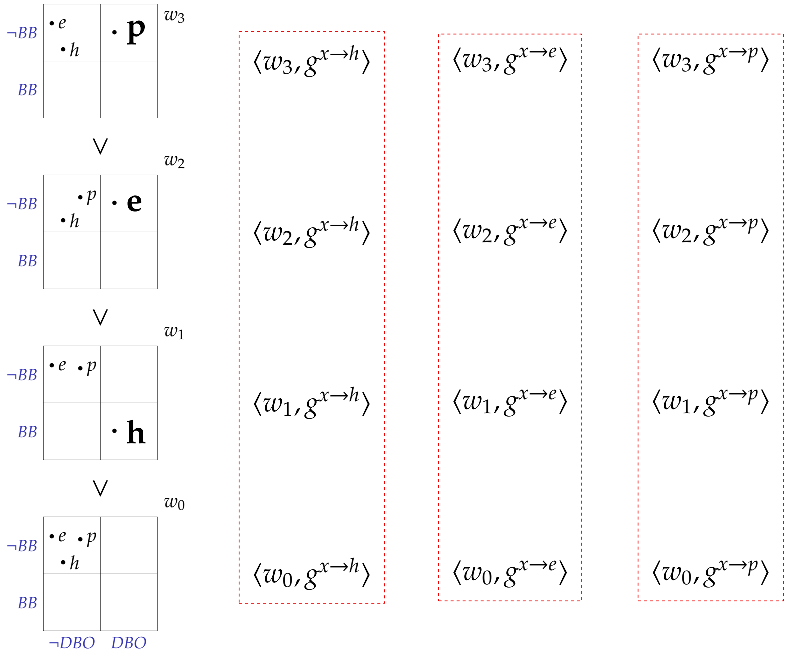

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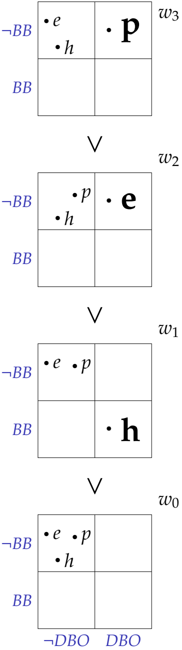

$$
\begin{array}{ccccc}
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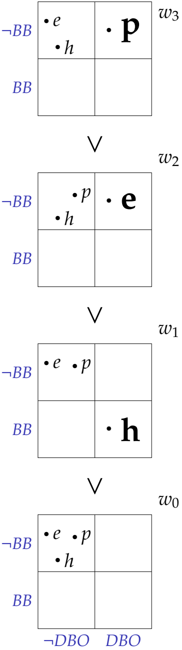

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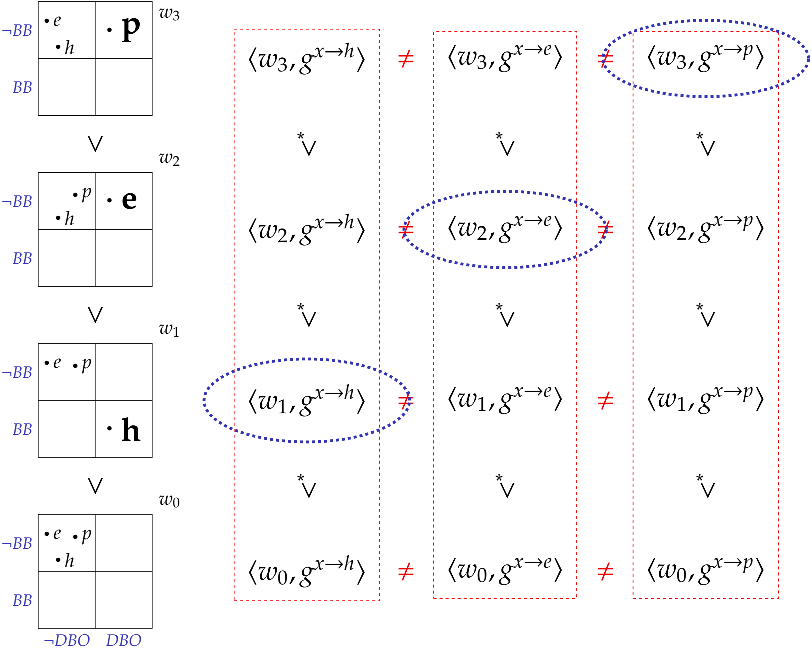
\end{array}
$$



w_3
w_2
w_1
w_0
¬BB
BB
¬DBO
DBO
$\langle w_3, g^{x\to h}\rangle \neq \langle w_3, g^{x\to e}\rangle \neq \langle w_3, g^{x\to p}\rangle$
$\langle w_2, g^{x\to h}\rangle \neq \langle w_2, g^{x\to e}\rangle \neq \langle w_2, g^{x\to p}\rangle$
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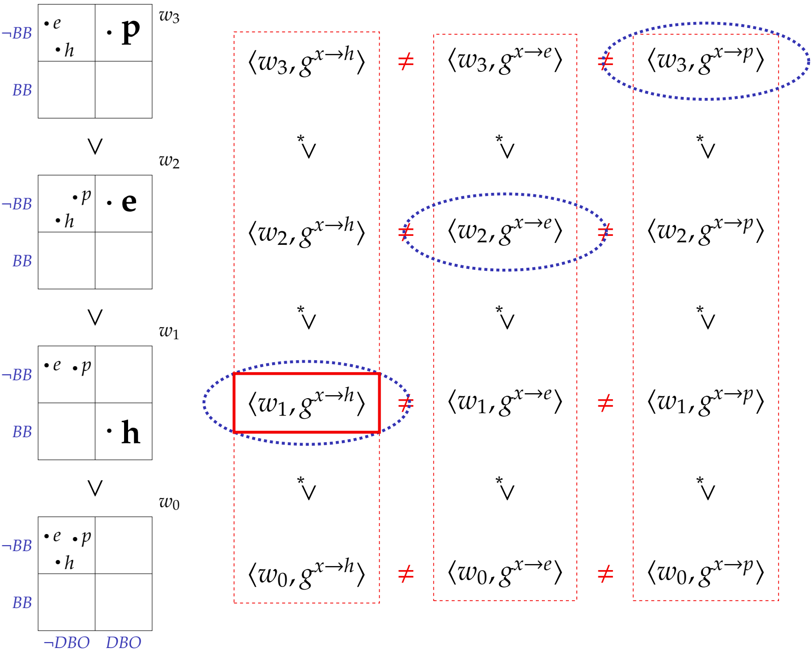

w3
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¬BB
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¬DBO
DBO
• e
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⟨w3, g^{x→h}⟩ ≠ ⟨w3, g^{x→e}⟩ ≠ ⟨w3, g^{x→p}⟩
⟨w2, g^{x→h}⟩ ≠ ⟨w2, g^{x→e}⟩ ≠ ⟨w2, g^{x→p}⟩
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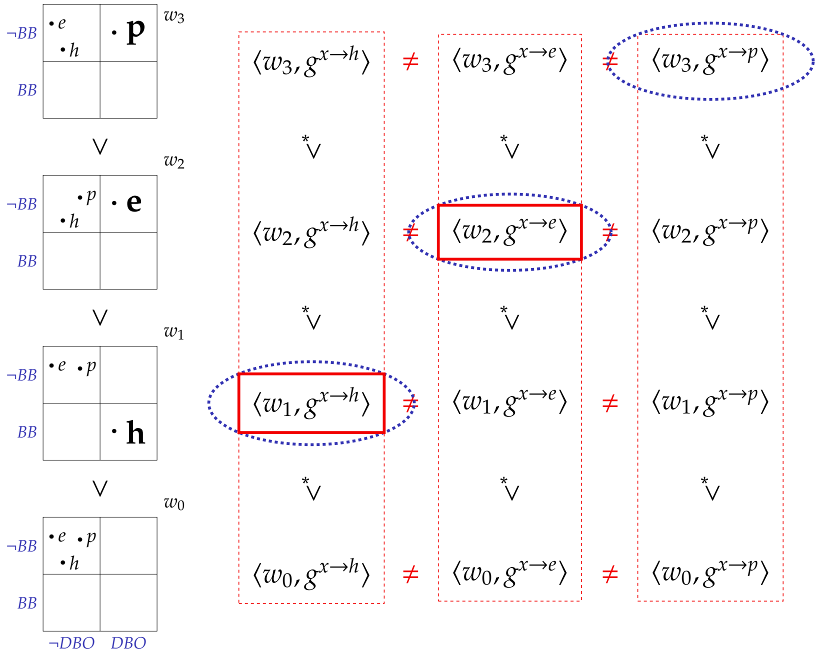

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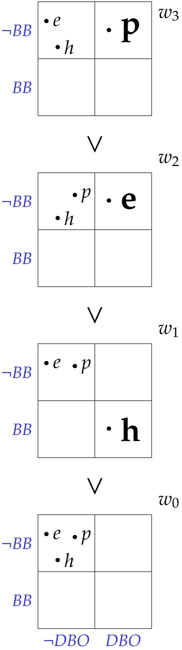

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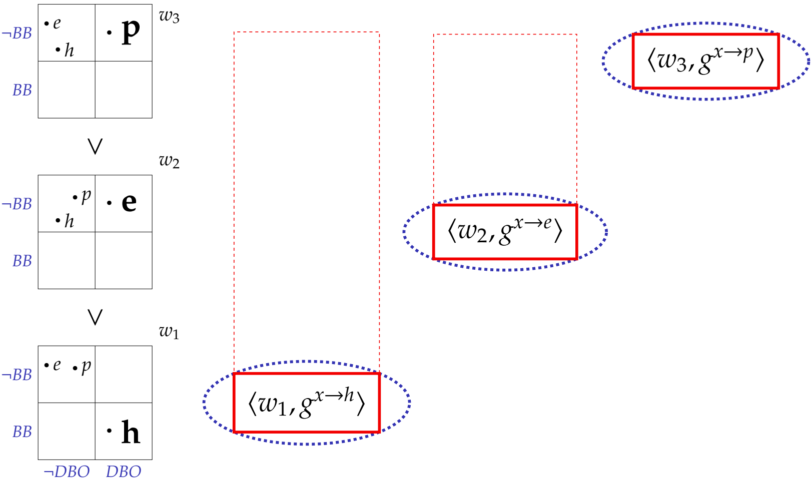

w_3
¬BB
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∨
w_2
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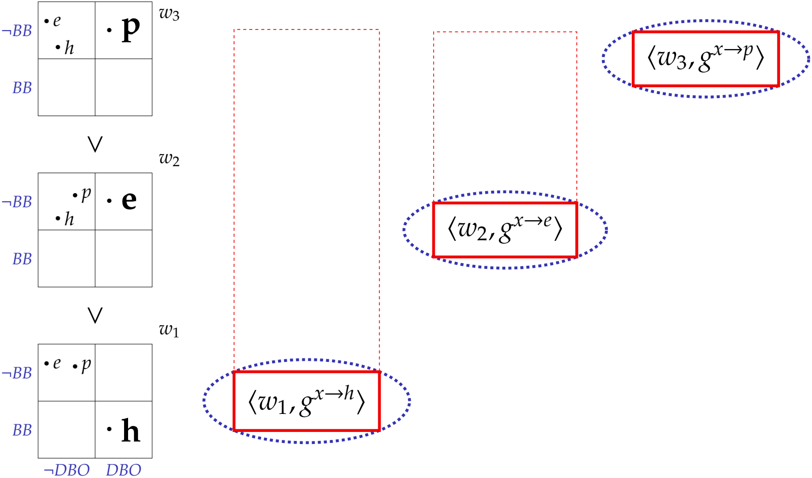
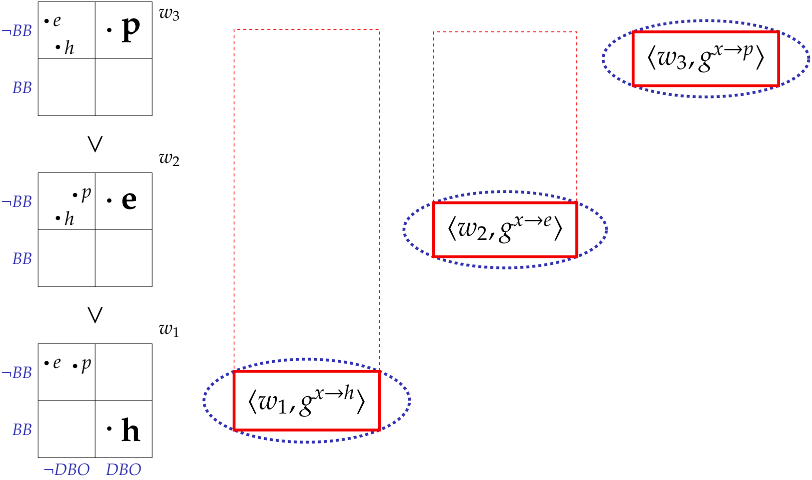


$$\exists x DBO(x) \mathrel{\Box\!\!\rightarrow} BB(x)$$



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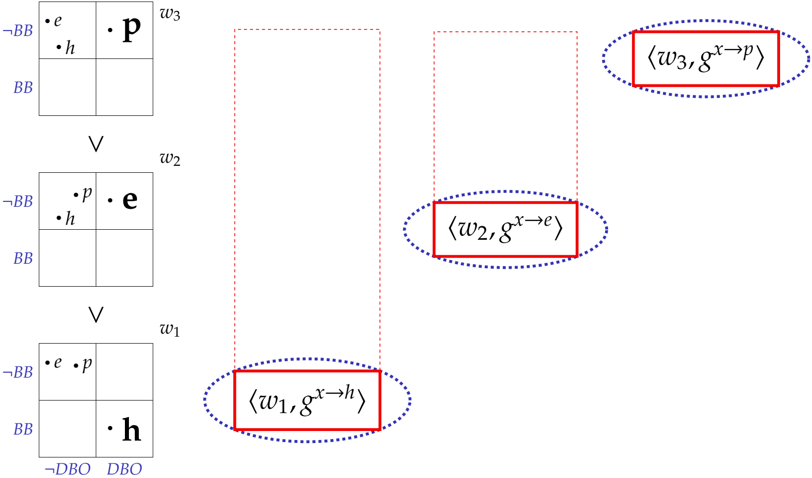


$$\exists x DBO(x) \; \Box\!\!\rightarrow \; BB(x) \quad ✗$$

Overview

New Data - Summary

(1) *Allie*: If Mary had made a vase, she would have made it from glass.

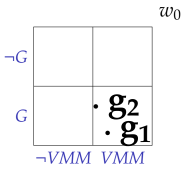
(2) *Bert*: But she could have made a clay vase (and she wouldn't have made *that* from glass)!

Case 1: Mary made two glass vases.

Case 2: Mary did not make any vases.

	Case 1	Case 2
(1)	✓	✗
(2)	??	✓

Problem for High Readings



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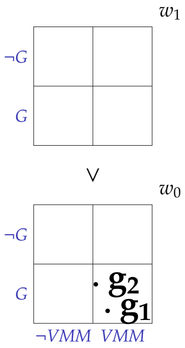

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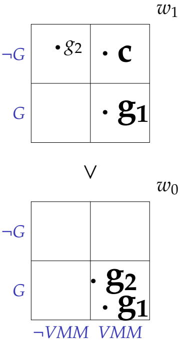

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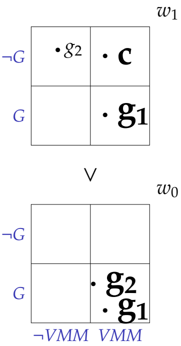

$\langle w_0, g^{x \to g_1} \rangle$ $\langle w_0, g^{x \to g_2} \rangle$ $\langle w_0, g^{x \to c} \rangle$

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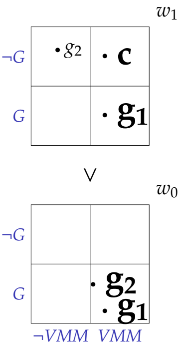

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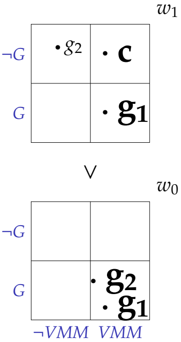

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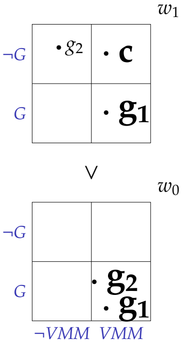

$$\begin{array}{ccccc}
\boxed{\begin{array}{c}\langle w_1, g^{x\to g_1}\rangle \\ \overset{*}{\vee} \\ \langle w_0, g^{x\to g_1}\rangle\end{array}} & \begin{array}{c}\neq \\ \\ \neq\end{array} & \boxed{\begin{array}{c}\langle w_1, g^{x\to g_2}\rangle \\ \overset{*}{\vee} \\ \langle w_0, g^{x\to g_2}\rangle\end{array}} & \begin{array}{c}\neq \\ \\ \neq\end{array} & \boxed{\begin{array}{c}\langle w_1, g^{x\to c}\rangle \\ \overset{*}{\vee} \\ \langle w_0, g^{x\to c}\rangle\end{array}}
\end{array}$$

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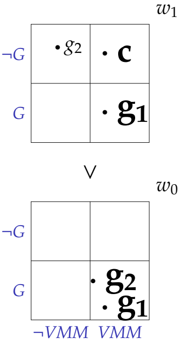

$$\exists x VMM(x) \mathrel{\Box\!\!\rightarrow} G(x)$$

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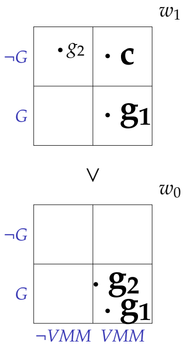

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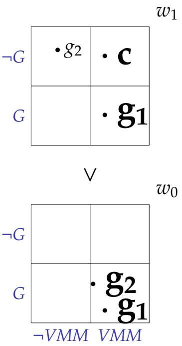

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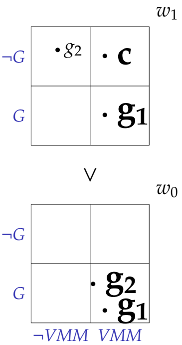

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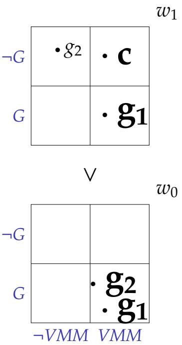

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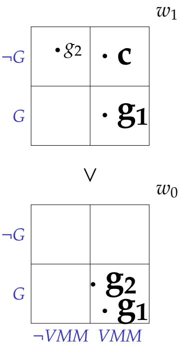

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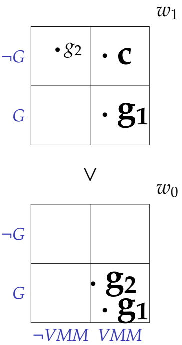

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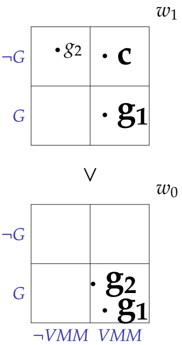

$\exists x VMM(x) \mathrel{\Box\!\!\rightarrow} G(x)$ $\qquad$ $w_1 \in [\![G(c)]\!]?$

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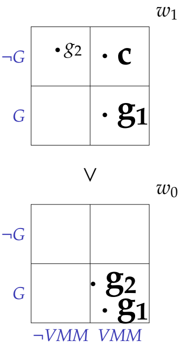

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$$
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Success of Special Orderings

Assumption: $\leq$ is *strongly centered*: $w_0 <_{w_0} w_1$

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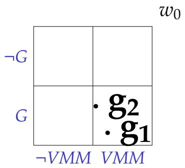

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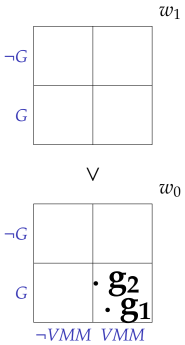

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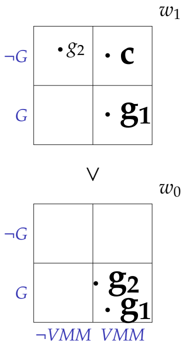

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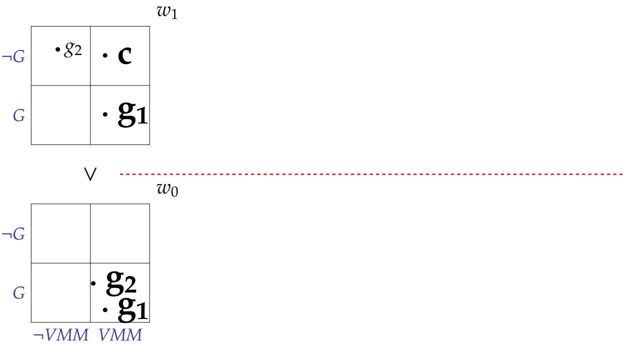

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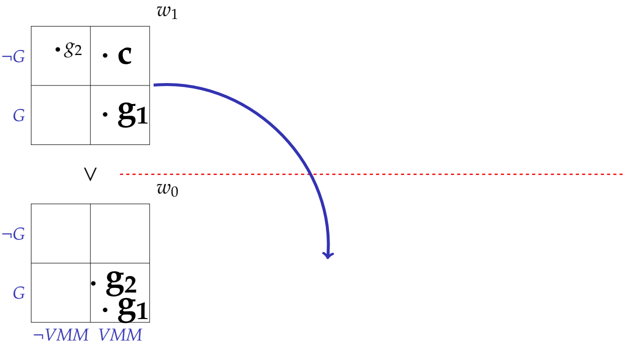

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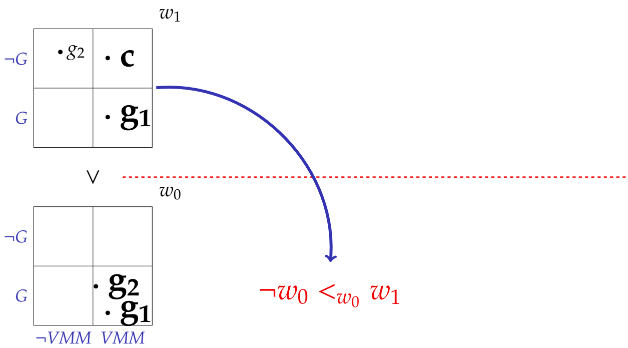

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Right predictions about the new data.

Overview

Saving High Readings: Weak?

Objection: the high reading accounts have ways of dealing with weak/low readings as well.

(20) a. If I had a dime, I would put it in the meter.
b. If I had picked a number, I would have picked 3.

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No. Consider

Case 3: Mary made one glass vase and one clay vase.

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This vase case is just one of those.

No. Consider

Case 3: Mary made one glass vase and one clay vase.

(1) false in this case, which is not what we'd expect on a weak/low reading.

Saving High Readings: QDR?

c in Case 1 gets ignored due to quantifier domain restriction.

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Maybe, but how can this get Case 2 right?

Saving High Readings: QDR?

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Maybe, but how can this get Case 2 right? Shouldn't the possible clay vase be irrelevant still?

Problem for Special Orderings?

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Walker and Romero (2015): cases of universal entailments without special order.

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(21) SCENARIO: Balaam took part in a game show which had the following format. If you win the easy first round, you win Herbert, an obnoxious and disobedient donkey. The reward for the much more difficult second and third rounds are the well-mannered and obedient donkeys Eeyore and Platero, respectively. Losing a round of the game eliminates the player, keeping them from advancing to any later rounds. Balaam was eliminated in the first round, and so remains donkeyless.

Problem for Special Orderings?

John, only aware of the game's first round, asserts (22), since he knows about Balaam's short temper.

(22) If Balaam owned a donkey, he would beat it.

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Sarah, who has more information about the game, corrects him with (23).

(23) No, Balaam could have won Platero or Eeyore too, and he wouldn't beat either of them if he owned them.

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Sarah, who has more information about the game, corrects him with (23).

(23) No, Balaam could have won Platero or Eeyore too, and he wouldn't beat either of them if he owned them.

Seems like Sarah is right, so there are universal entailments.

Problem for Special Orderings?

John, only aware of the game's first round, asserts (22), since he knows about Balaam's short temper.

(22) If Balaam owned a donkey, he would beat it.

Sarah, who has more information about the game, corrects him with (23).

(23) No, Balaam could have won Platero or Eeyore too, and he wouldn't beat either of them if he owned them.

Seems like Sarah is right, so there are universal entailments. But intuitively, the world where Balaam wins only one round is more similar to the actual world than ones where he wins two or three. So no special order.

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Lewis (1979): weight violations of law more than disparities in other facts.

We still need a theory of the closeness ordering that predicts special orderings in the right cases, but nothing has ruled this out yet.

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Response part 2: actually, the high reading account needs special orderings too.

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(25) SCENARIO: Cory, who is donkeyless, is a bit crazy. He's disposed to take out his anger on his most prized possession. He also took part in the game show described in (21), but also lost in the first round. Had he won any rounds, the prize from the most advanced round he won would have become his prized possession, and he would have beaten it, but he wouldn't beat anything else.

Now consider the following.

(26) If Cory owned a donkey, he would beat it.

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Now consider the following.

(26) If Cory owned a donkey, he would beat it.

In this scenario, the salient reading of (26) seems false. If Cory had owned Eeyore, he would own but not beat Herbert.

Problem for Special Orderings?

To get this right, the high reading account needs the worlds where Cory wins 2 or 3 donkeys to be as close as the one where he wins 1. It needs a special ordering.

But then we can get the right results from the special ordering alone, without the high reading.

Overview

Takeaway

Counterfactual donkey sentences have universal entailments, but not of the sort we'd expect from high reading accounts.

The special ordering account seems to get things right. But we still need a theory of how these orderings arise.

Thanks!

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