

From “ e_1 CAUSE e_2 ” to “ $\textcircled{A} \rightarrow \textcircled{B}$ ”

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The talk

- (Causal models model verbal meanings better than Davidsonian event arguments in several ways)
- But can causal models model the eventive/stative distinction?
- Yes
- And because nodes in causal models can have values other than truth values, we get some new fun stuff to think about

e_1 CAUSE e_2



- Adverbial modification?
- Pronominal reference?
- Captures entrainment?
- Allows absence of result?
- Interference easily modeled?
- Eventive/stative distinction?

yes

(yes)

yes

(yes)

no

yes

no

yes

no

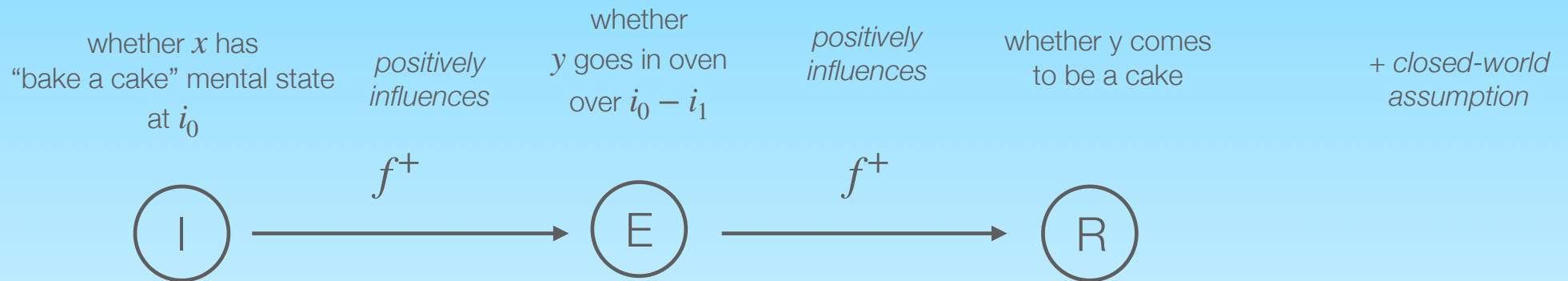
yes

partly

?

bake a cake

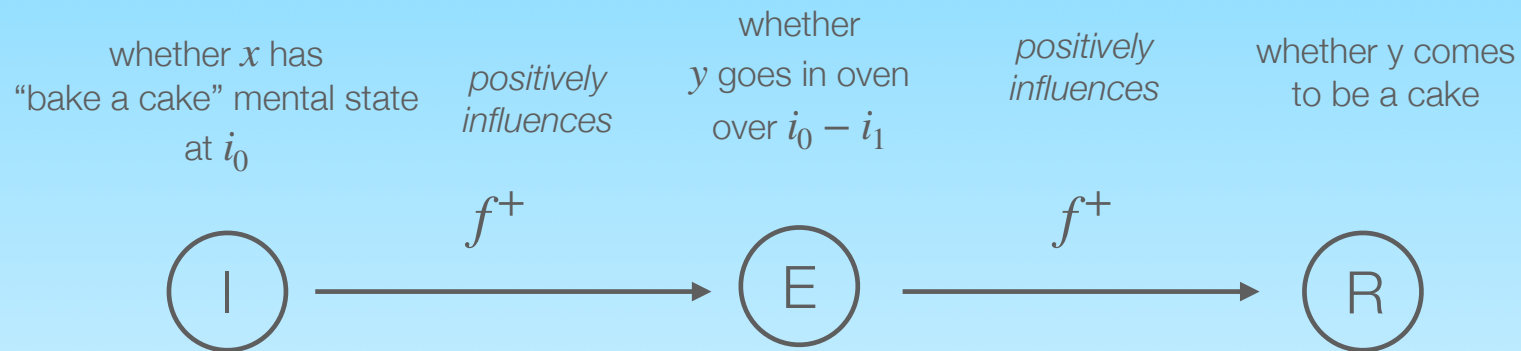
I	E	R
1	1	1
0	0	0



- Models entrainment
- Allows absence of result
- Interference easily modeled

bake a cake

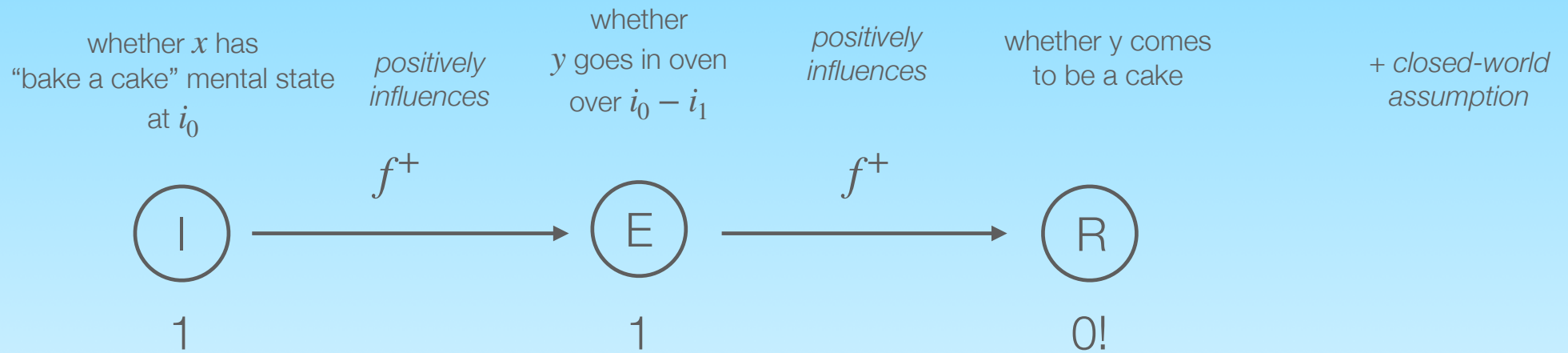
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- Models entrainment ✓
- Allows absence of result
- Interference easily modeled

bake a cake

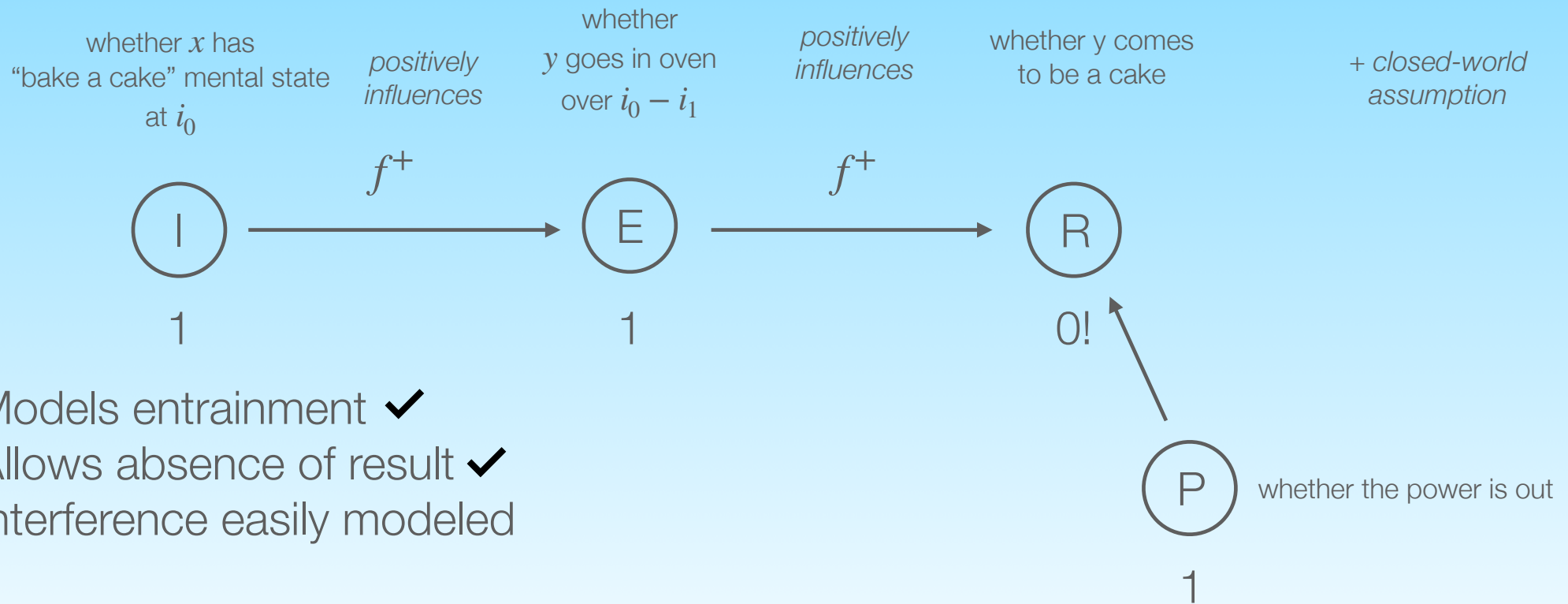
I	E	R
1	1	1
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- Models entrainment ✓
- Allows absence of result
- Interference easily modeled

bake a cake

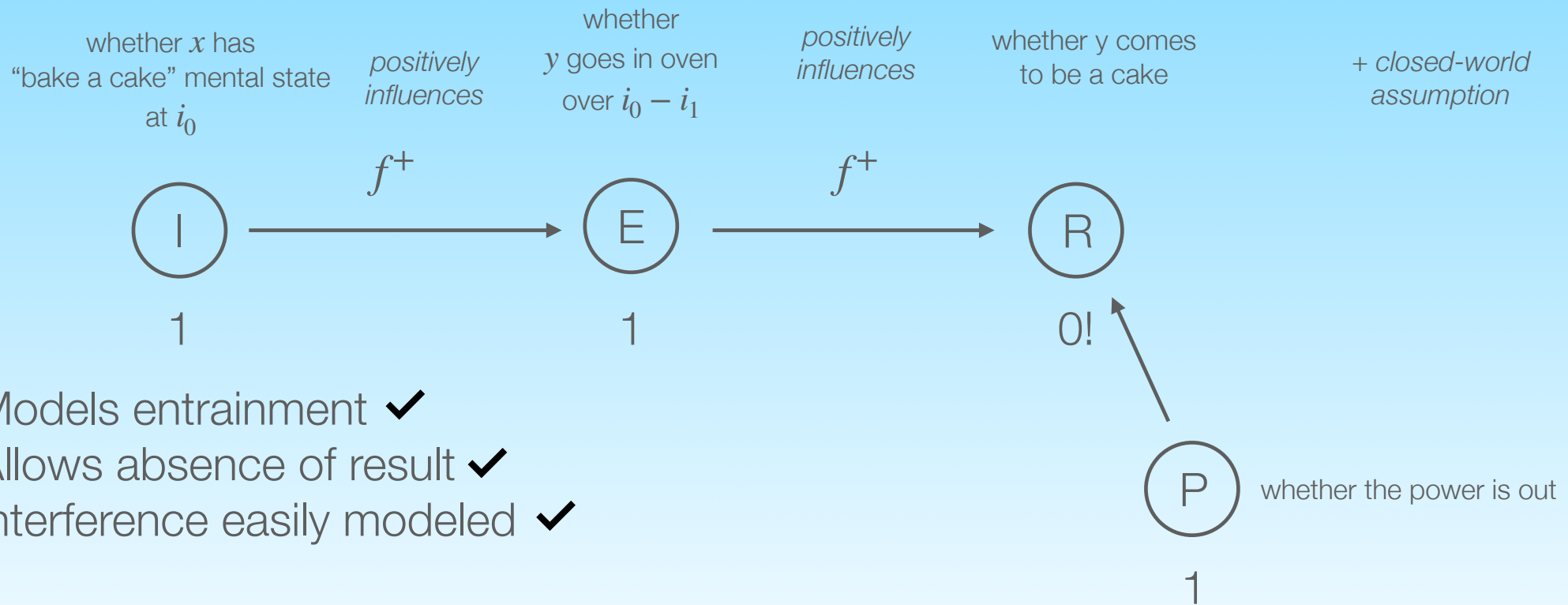
I	E	R
1	1	1
0	0	0



- Models entrainment ✓
- Allows absence of result ✓
- Interference easily modeled

bake a cake

I	E	R
1	1	1
0	0	0



- Models entrainment ✓
- Allows absence of result ✓
- Interference easily modeled ✓

cf. Copley & Kagan to appear

Eventivity and stativity

Must test: Has epistemic reading as episodic prejacents of *must* \Rightarrow has a stative reading

- (1) a. Mary must be home. has epistemic reading \Rightarrow has stative reading
b. Mary must go home. no epistemic reading \Rightarrow no stative reading

Relevance test: Has relevance reading as episodic consequent of conditional \Rightarrow has a stative reading

- (2) a. If you want to talk to her, Mary is at home. has relevance reading \Rightarrow has stative reading
b. If you want to talk to her, Mary goes home. no relevance reading \Rightarrow no stative reading

Episodic non-futurate, non-storytelling reading with simple present in English:

- (3) a. Mary is at home. is ok \Rightarrow has stative reading
b. #Mary goes home. not ok \Rightarrow no stative reading

Surprisingly, episodic *stay* is eventive



Must test: Has epistemic reading as episodic preagent of *must* \Rightarrow has a stative reading

(4) Mary must stay home.

no epistemic reading \Rightarrow no stative reading

Relevance test: Has relevance reading as episodic consequent of conditional \Rightarrow has a stative reading

(5) If you want to talk to her, Mary stays home.

no relevance reading \Rightarrow no stative reading

English simple present test:

(6) #Mary stays home.

not ok \Rightarrow no stative reading

It seems like the subject might be “doing something” that causes them to remain wherever they are? But e_1 CAUSE e_2 doesn't seem to be the right way to model *stay* as there don't seem to be two events there.

Almost but not quite



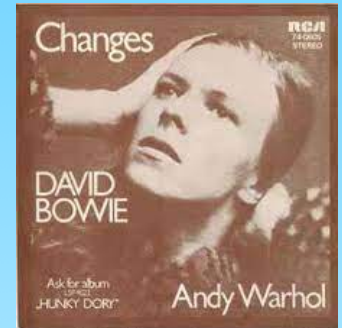
Assuming: What these three tests show is exactly the eventivity vs. stativity distinction...

Ontological hunch: Eventivity has something to do with change...

Problem: ...except when it doesn't, as in *stay*

A new proposal (version 1)

Consider that **change = difference through time**



STATIVES

EVENTIVES

	not through time	through time
no difference	stative predicates	predicates of maintaining (e.g. <i>stay</i>)
difference	?	predicates of change

with thanks to Jacqueline Guéron

Making a difference, but not in time

These predicates are *episodic* and *stative*

- (7) That must make a difference / make sense to Mary.
- (8) The flowers must brighten the room.
- (9) This road must go to Phoenix.
- (10) This problem must bother Mary.
- (11) These data must differ/matter/suffice/vary.
- (12) That rocks/rules/grooves/sucks rocks/kicks butt.



A new proposal (version 1)

STATIVES

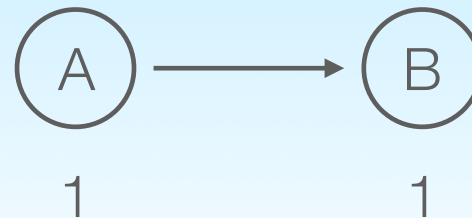
EVENTIVES

	not through time	through time
no difference	stative predicates	predicates of maintaining (e.g. <i>stay</i>)
difference	stative difference predicates	predicates of change

Causal models are better for this



- Can express a difference that doesn't happen in time because time need not be represented
- Can represent alternative (counterfactual) possibilities effortlessly
- Allows us to use **differences** as values of nodes



A	B
1	1
0	0

Nodes as *whether/truth*-predications

$p(x) = t$ let's call this p a “whether-predicate or a truth-predicate”



“whether $p(x)$ (is true)”



Ⓟ
1
0

Nodes as *how/degree*-predications

$p(x) = d$ let's call this p a “how-predicate” or a “degree-predicate”

“the degree to which x is p ”
“how p x is”

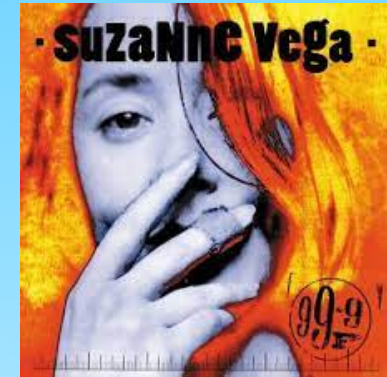


Ⓟ
98°
99°
100°
101°

cf. Kennedy & McNally 2005

Note: you can always turn a degree-node back into a truth-node with \exists :

“whether $\exists x : p(x) = d$ (is true)”



Truth-predicates are a type of degree-predicate

$$p(x) = d$$



e.g. $p = \text{HOT}$

$$p(x) = d$$



e.g. $p = \text{DEAD}$

$$p(x) = t$$



e.g. $p = \text{IN THE ROOM}$

That is, formally truth values are just a kind of degree (albeit a pretty special one)!

A node's value can also be a difference



$$p(x) = d$$



e.g. p = HOT

$$p(x) = \Delta d$$



e.g. p = HEAT

$$p(x) = d$$



e.g. p = BE DEAD

$$p(x) = \Delta d$$



e.g. p = DIE

(P)

[98°,98°]
[98°,99°]
[98°,100°]
[98°,101°]
...

(P)

[0,0]
[0,1]

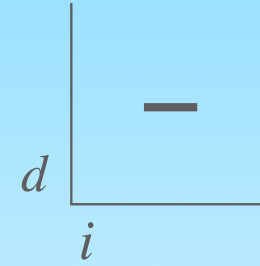
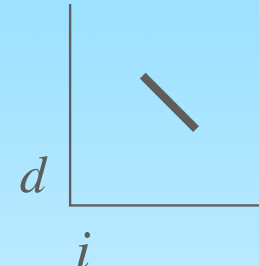
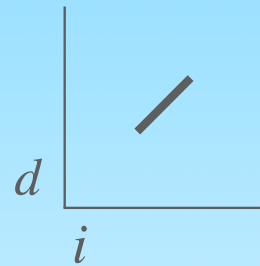


cf. Kennedy & Levin 2008

Change = difference through time



$$p(x) = \Delta d$$

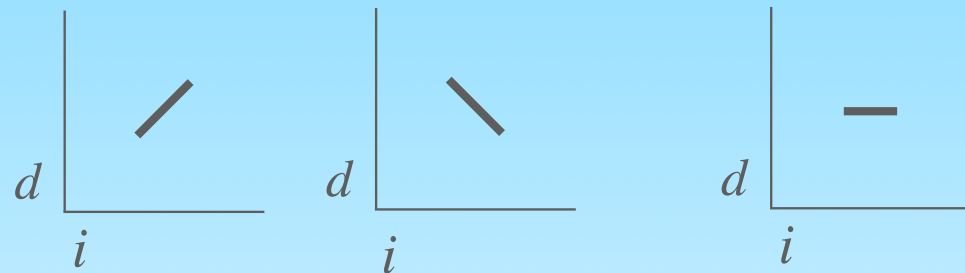


$$p(x) = ??????$$

$$p(x)(\Delta i) = \Delta d$$

cf. Croft 2012

Slopes



$$p(x)(\Delta i) = \Delta d$$

$$p(x)(\Delta i) = d$$

$\Delta^+ d$

$\Delta^- d$

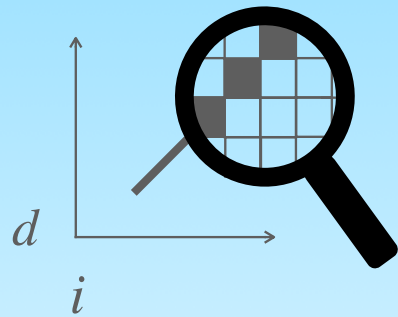
d



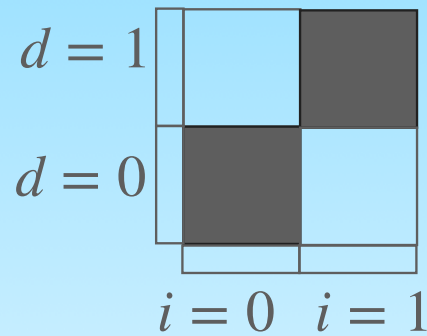
cf. Copley & Harley 2022 ms.

Slopes with truth values/categorical scales

$$p(x)(\Delta i) = \Delta d$$

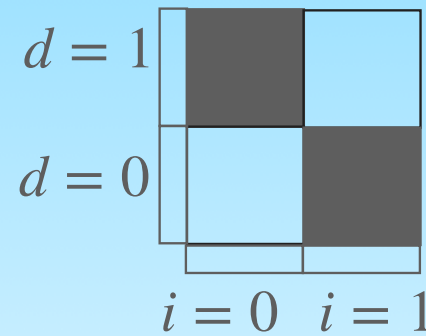


$$p(x)(\Delta i) = \Delta d$$



Δ^+d

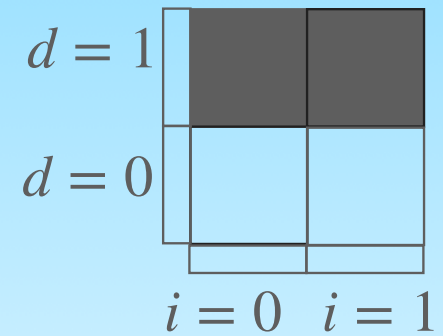
BECOME



Δ^-d

BECOME-NOT

$$p(x)(\Delta i) = d$$



d

STAY

no BECOME operator needed!

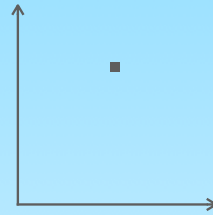
We can model individual-level and stage-level stative predicates as per Kratzer 1995...

$$p(x) = d$$



individual-level predication

$$p(x)(i) = d$$



stage-level predication

...which gives us the following typology:

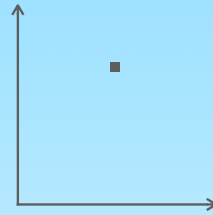
A new proposal (version 2)

$$p(x) = d$$



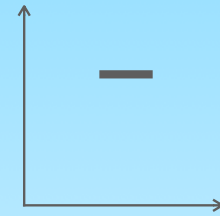
individual-level predication

$$p(x)(i) = d$$



stage-level predication

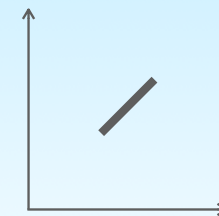
$$p(x)(\Delta i) = d$$



stay

“event-level predication”

$$p(x)(\Delta i) = \Delta d$$



change

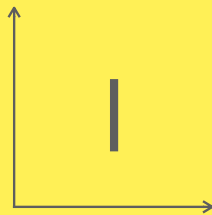
“event-level difference predication”

$$p(x) = \Delta d$$



“individual-level difference predication”

$$p(x)(i) = \Delta d$$



“stage-level difference predication”

e_1 CAUSE e_2

- adverbial modification
- pronominal reference



- (adverbial modification)
- (pronominal reference)
- captures entrainment
- doesn't entail result
- interference easily modeled
- eventive/stative distinction ✓

Conceptually, an **event** is whatever you want.

Grammatically, the hypothesis here is that causal models corresponding to **eventives** contain an “event-level predication” node, i.e., a predication that has a temporal difference argument Δi .

open the window

f^+ :

\textcircled{T}	\textcircled{R}
1	1
0	0

whether x has properties normally sufficient to cause opening at i_0

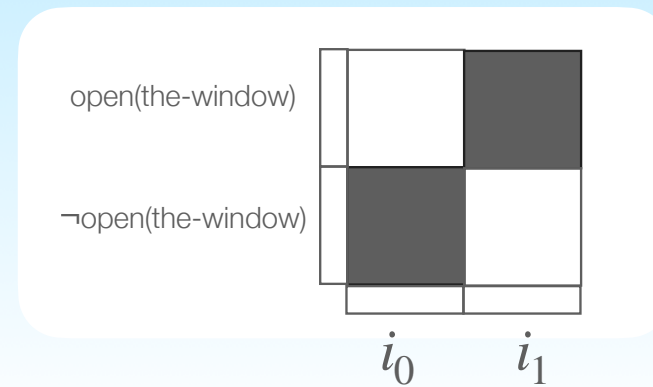
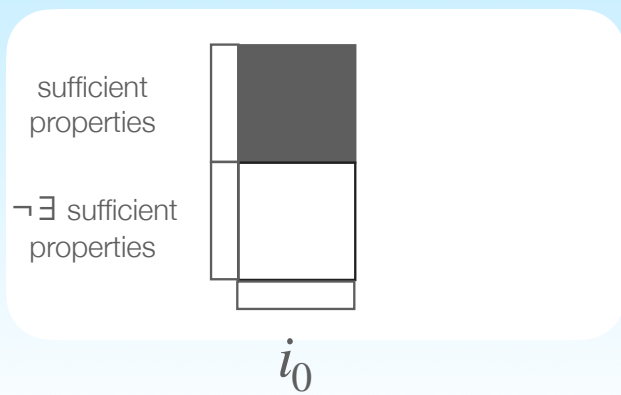
positively influences

whether the window becomes open from i_0 to i_1

+ closed-world assumption



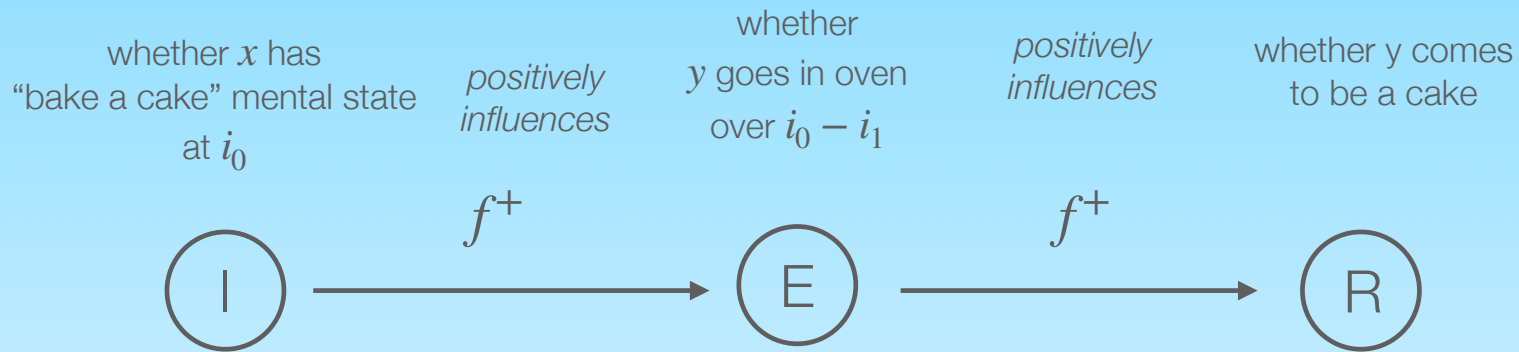
f^+



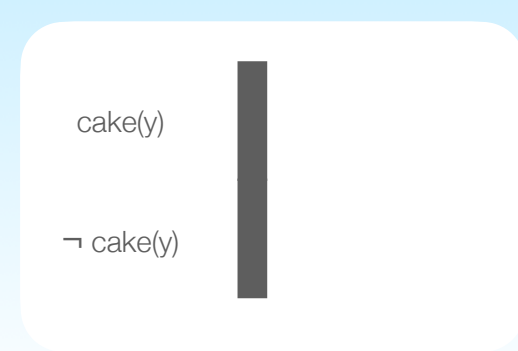
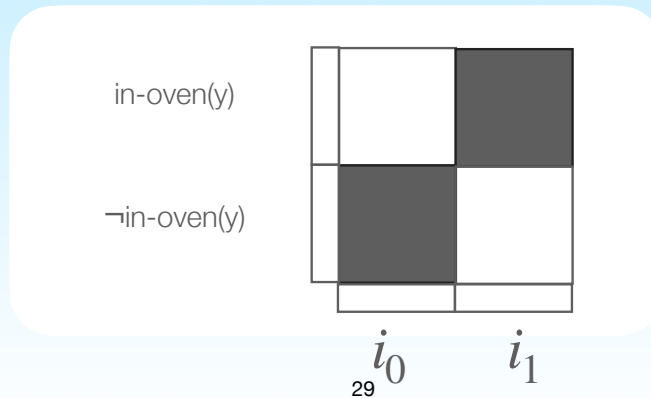
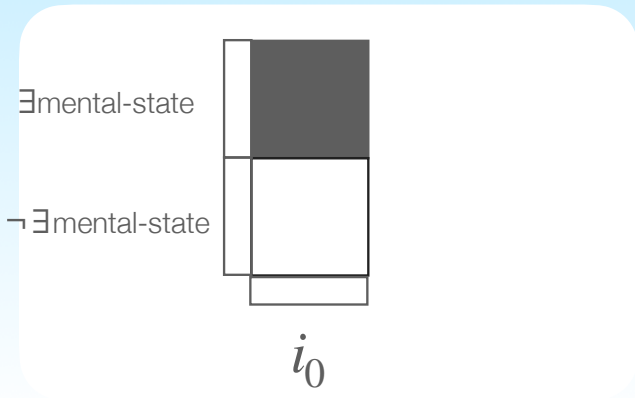
- (xx) a. Mary opened the window for a few minutes.
- b. #Mary baked a cake for a few minutes.
- c. Mary made noise for a few minutes.

bake a cake

\textcircled{I}	\textcircled{E}	\textcircled{R}
1	1	1
0	0	0



+ closed-world assumption



make noise

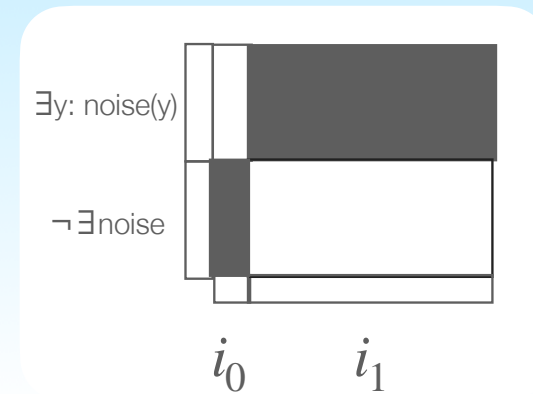
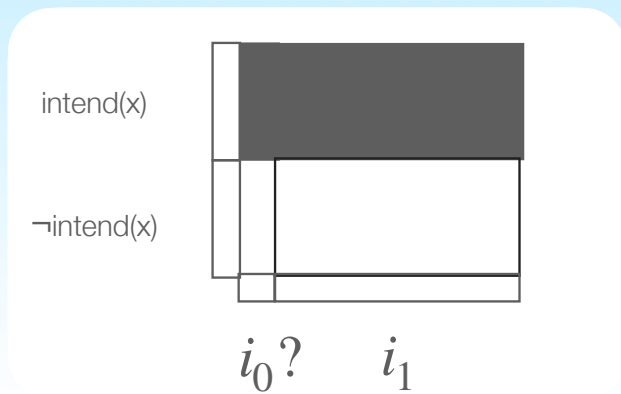
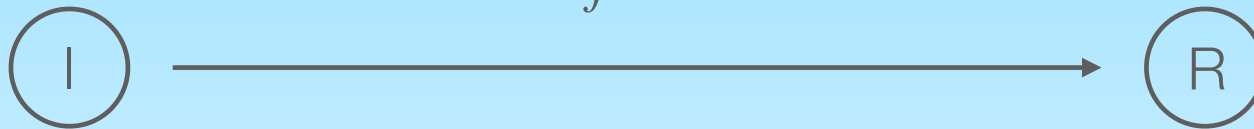
\textcircled{T}	\textcircled{R}
1	1
0	0

whether x has
"make noise" mental state
over $i_0? - i_1$

positively
influences

whether
there comes to be
noise over $i_0 - i_1$

+ *closed-world
assumption*



Wait, are you giving up on the idea that eventives \Leftrightarrow energy?

No, but today I'm trying to keep it in the conceptual realm and use temporal intervals as the grammatical clue to (conceptual) energy.

Changes require energy.
But energy does not require change,
because staying requires energy but no change.

But *stay* has a “zero-change”, which I claimed here counts as eventive precisely because it has a temporal interval.

\Rightarrow ? Energy requires a temporal interval.

If we can also say the converse, i.e. that temporal intervals require energy,

\Rightarrow We won't need to represent energy directly, we can just represent temporal intervals and thereby recover the existence of energy.

