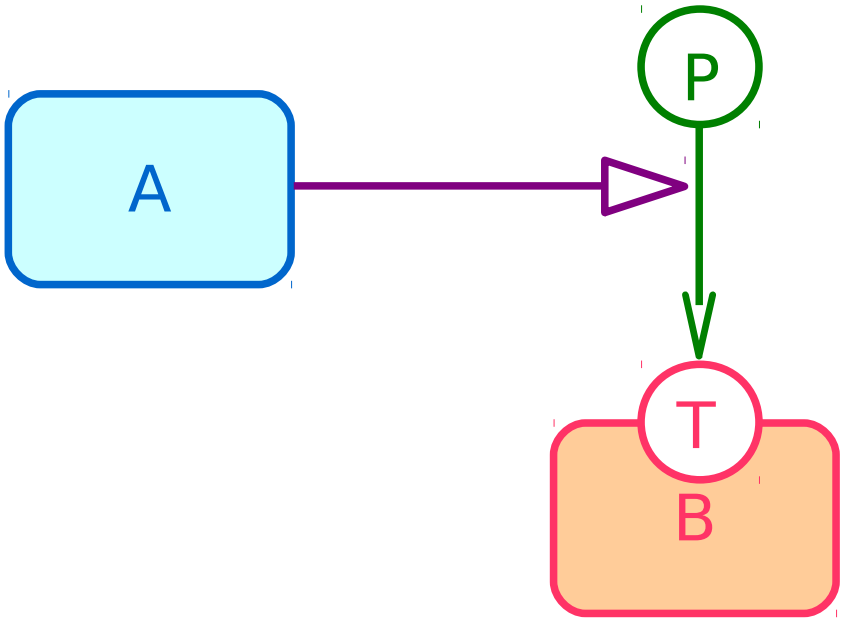
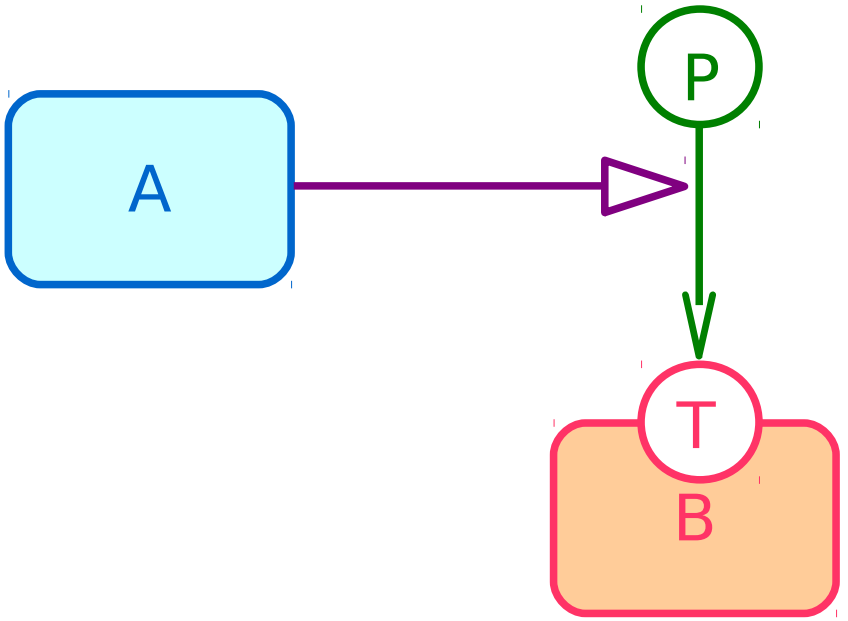
Report on the status of SBGN ER and proposed modifications/extensions

Entity Relationships can be viewed as rules



If A exists, the assignment of the value P to the state variable T of B is increased

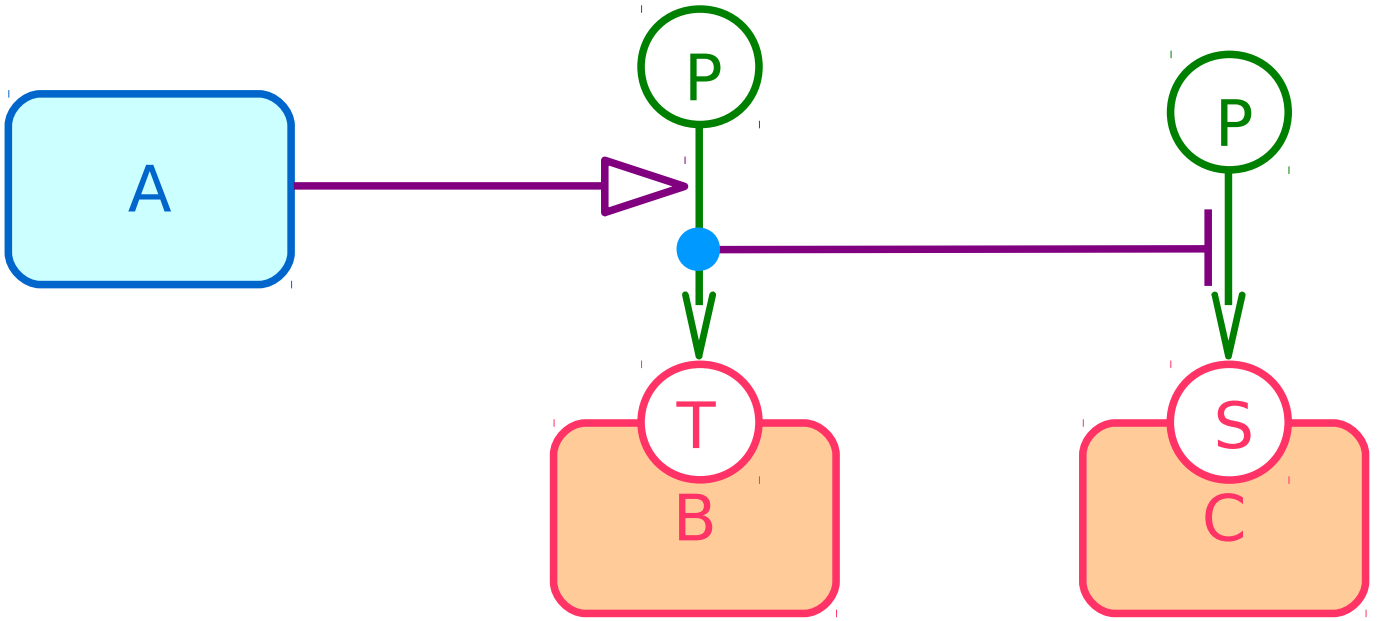
Entity Relationships can be viewed as rules



If A exists, the assignment of the value P to the state variable T of B is increased

(A stimulates the phosphorylation of B on the threonine)

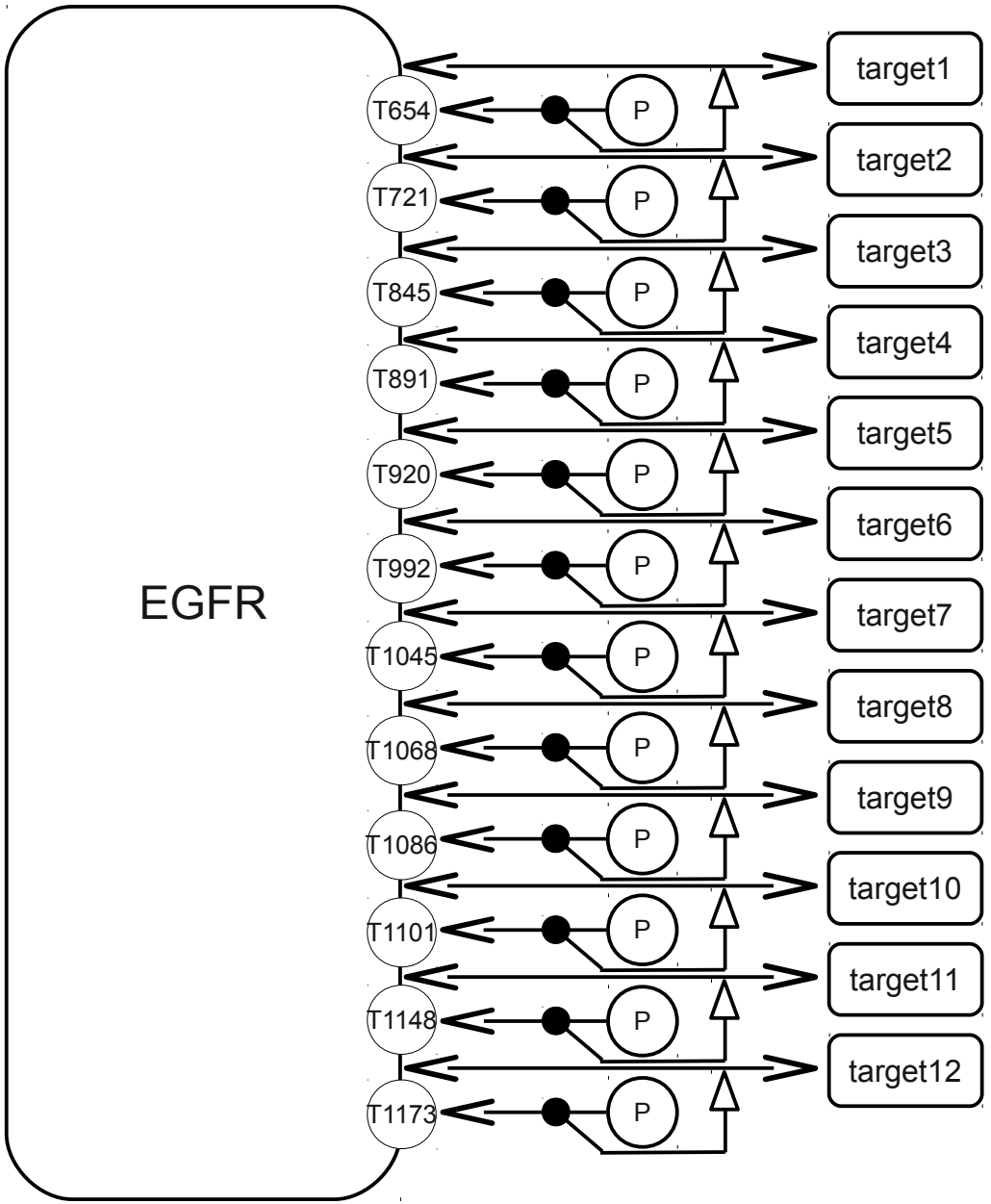
Entity Relationships can be viewed as rules



If A exists, the assignment of the value P to the state variable T of B is increased

If P is assigned to the state variable T of B, the assignment of the value P to the state variable S of C is decreased

Multi-state and combinatorial explosion



Process Descriptions:
“once a state variable value,
always a state variable value”

2^{12} = 4096 states
(i.e. EPN glyphs) for EGFR
and 4096 complexes between
EGFR and targets

Entity Relationships L1 V1.2 reference card

Entity Nodes

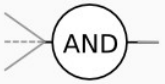
Interactors

entity

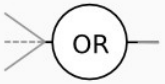
outcome

perturbing agent

Logical Operators

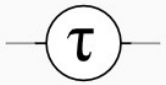


and operator



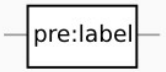
or operator

not operator

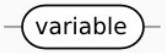


delay operator

Auxiliary units



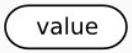
unit of information



state variable

existence

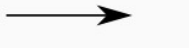
location



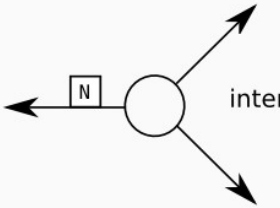
variable value

Relationship Nodes

Statements



assignment



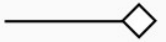
interaction

observable

reference nodes

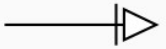
annotation

Influence

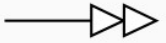


modulation

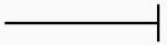
stimulation



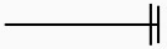
necessary stimulation



absolute stimulation



inhibition



absolute inhibition

logic arc

Entity Relationships L1 V1 syntax

symbols \ Arc	*assignment*	*interaction*	*modulation*	*stimulation*	*inhibition*	*necessary stimulation*	*absolute stimulation*	*absolute inhibition*	*logic arc*
entity		IO	I	I	I	I	I	I	I
outcome		I(1)O(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
and			I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)O
or			I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)O
not			I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)O(1)
delay			I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)O(1)
perturbing agent			I	I	I	I	I	I	I
unit of information		IO							
state variable	I(1)O(1)								
modulation				O	O	O	O	O	
stimulation				O	O	O	O	O	
inhibition				O	O	O	O	O	
necessary stimulation				O	O	O	O	O	
absolute stimulation				O	O	O	O	O	
absolute inhibition				O	O	O	O	O	
assignment				O	O	O	O	O	
interaction				O	O	O	O	O	
phenotype				O	O	O	O	O	

Example of Entity Relationships L1 V1 semantics

3.4.2 Influences

A *modulation* (Section 2.4.3.1) linking an *entity node* E and a relationship R means: "If E exists then R is either reinforced or weakened".

A *stimulation* (Section 2.4.3.2) linking an *entity node* E and a relationship R means: "If E exists then R is reinforced" or "If E exists then the probability of R is increased".

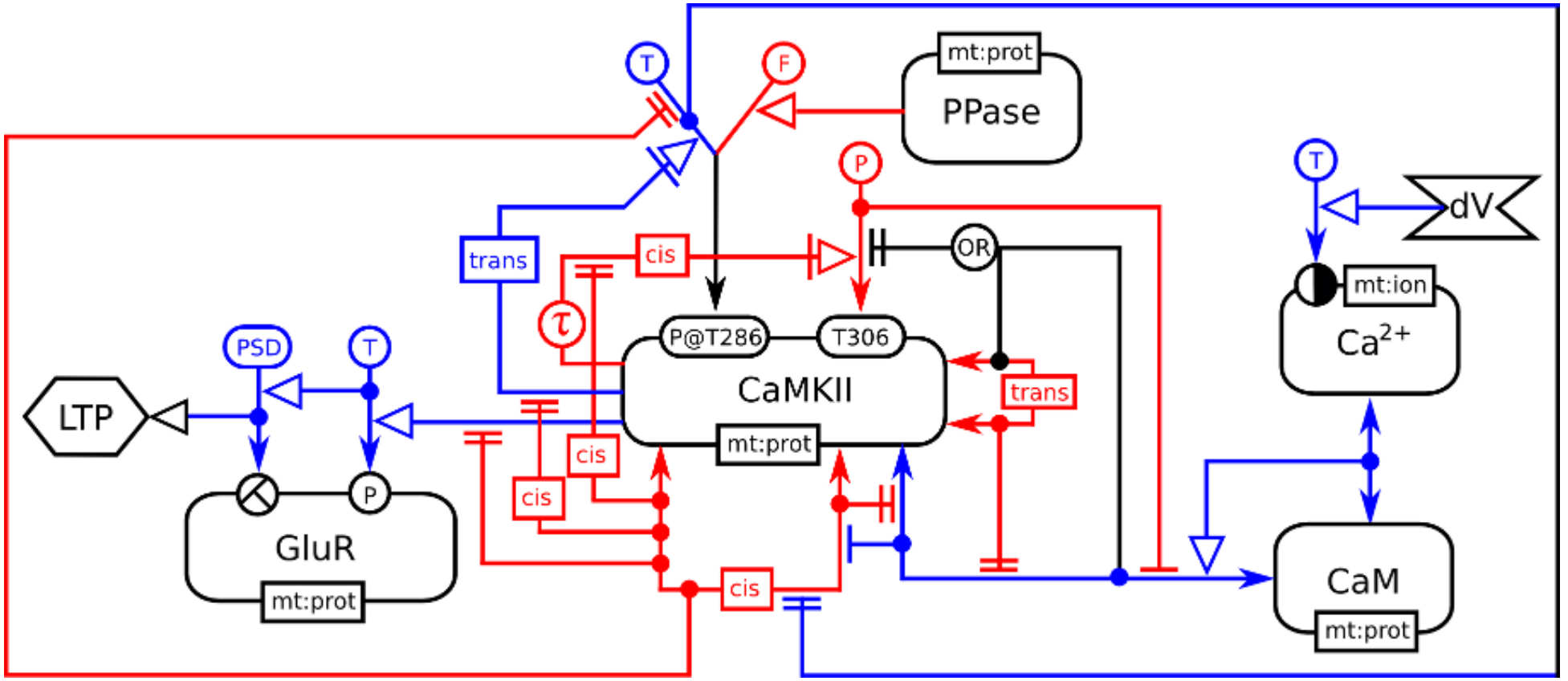
An *absolute stimulation* (Section 2.4.3.6) linking an *entity node* E and a relationship R means: "If E exists then R always takes place".

A *necessary stimulation* (Section 2.4.3.4) linking an *entity node* E and a relationship R means: "R only takes place if E exists.

An *inhibition* (Section 2.4.3.3) linking an *entity node* E and a relationship R means: "If E exists then R is weakened" or "If E exists then the probability of R is lowered".

An *absolute inhibition* (Section 2.4.3.5) linking an *entity node* E and a relationship R means: "If E exists then R never takes place".

ER map of calcium-regulated synaptic plasticity



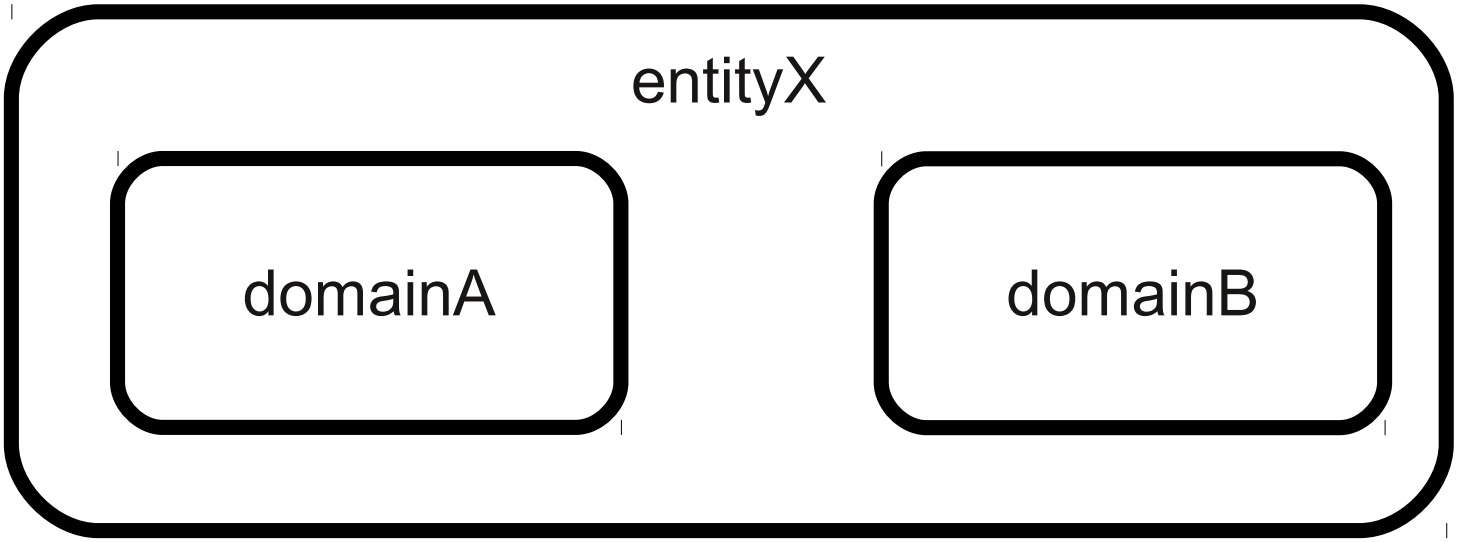
increases synaptic weight

decreases synaptic weight

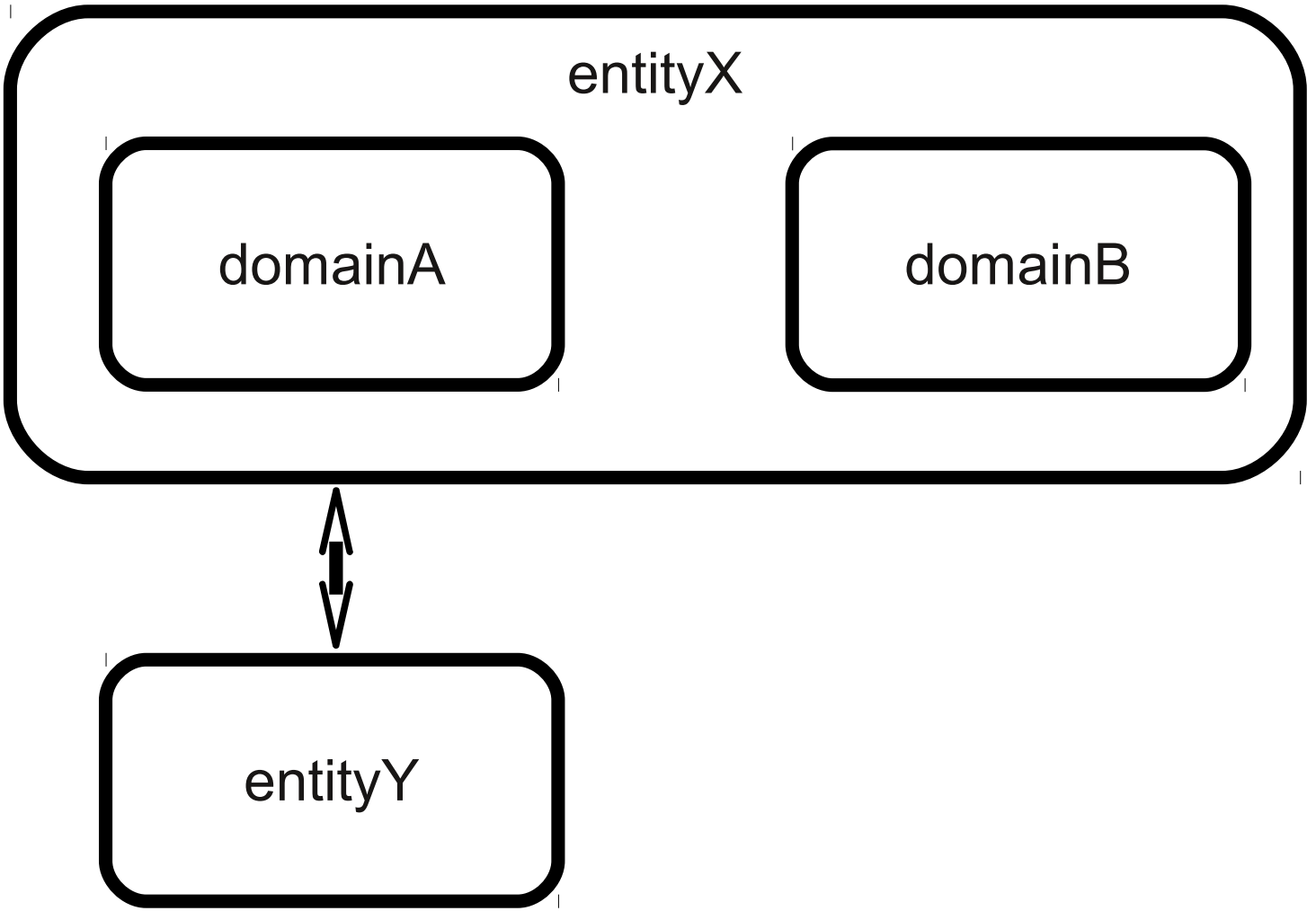
Entity Relationships L1 V2

nested entities

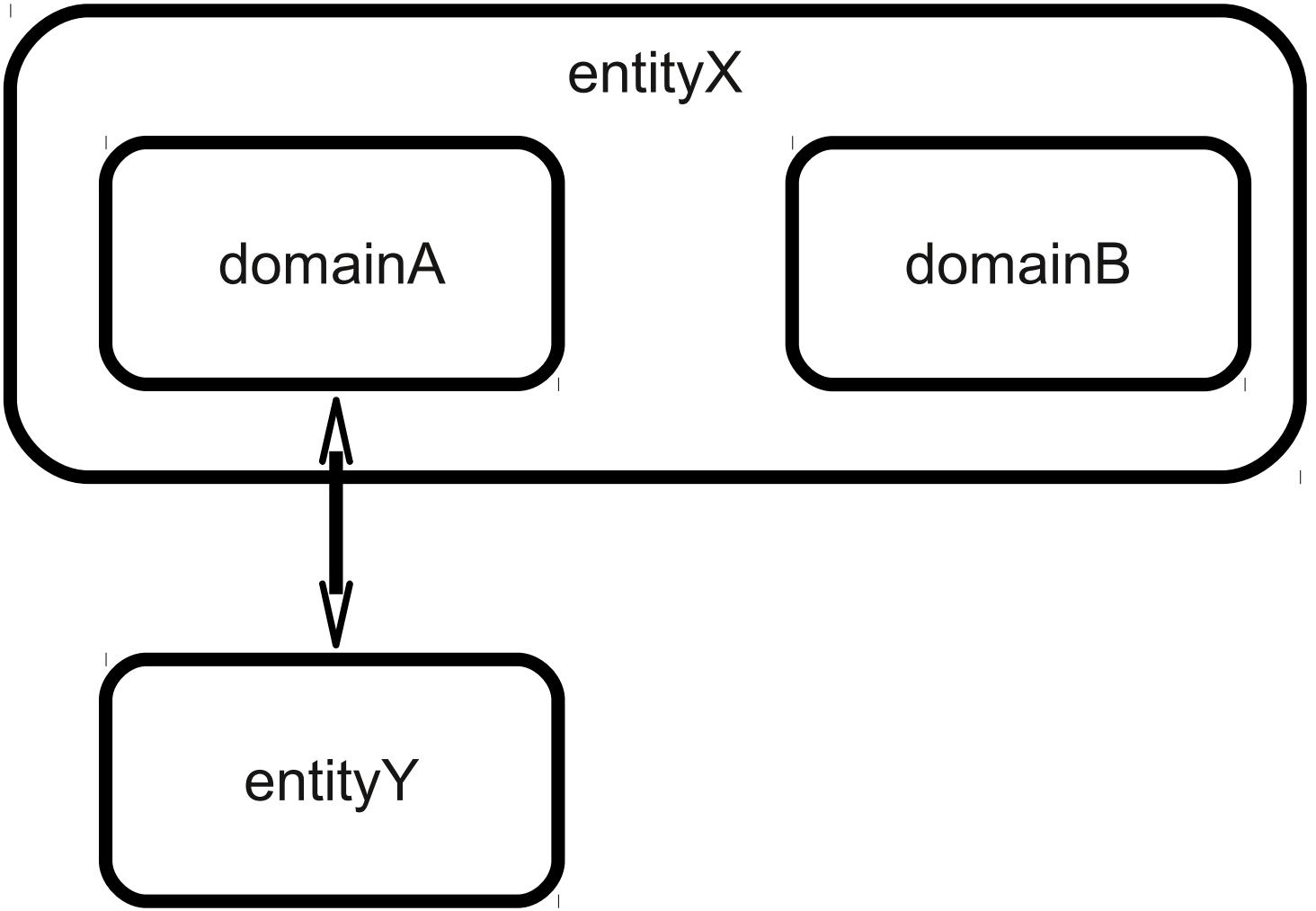
A and B are part of X



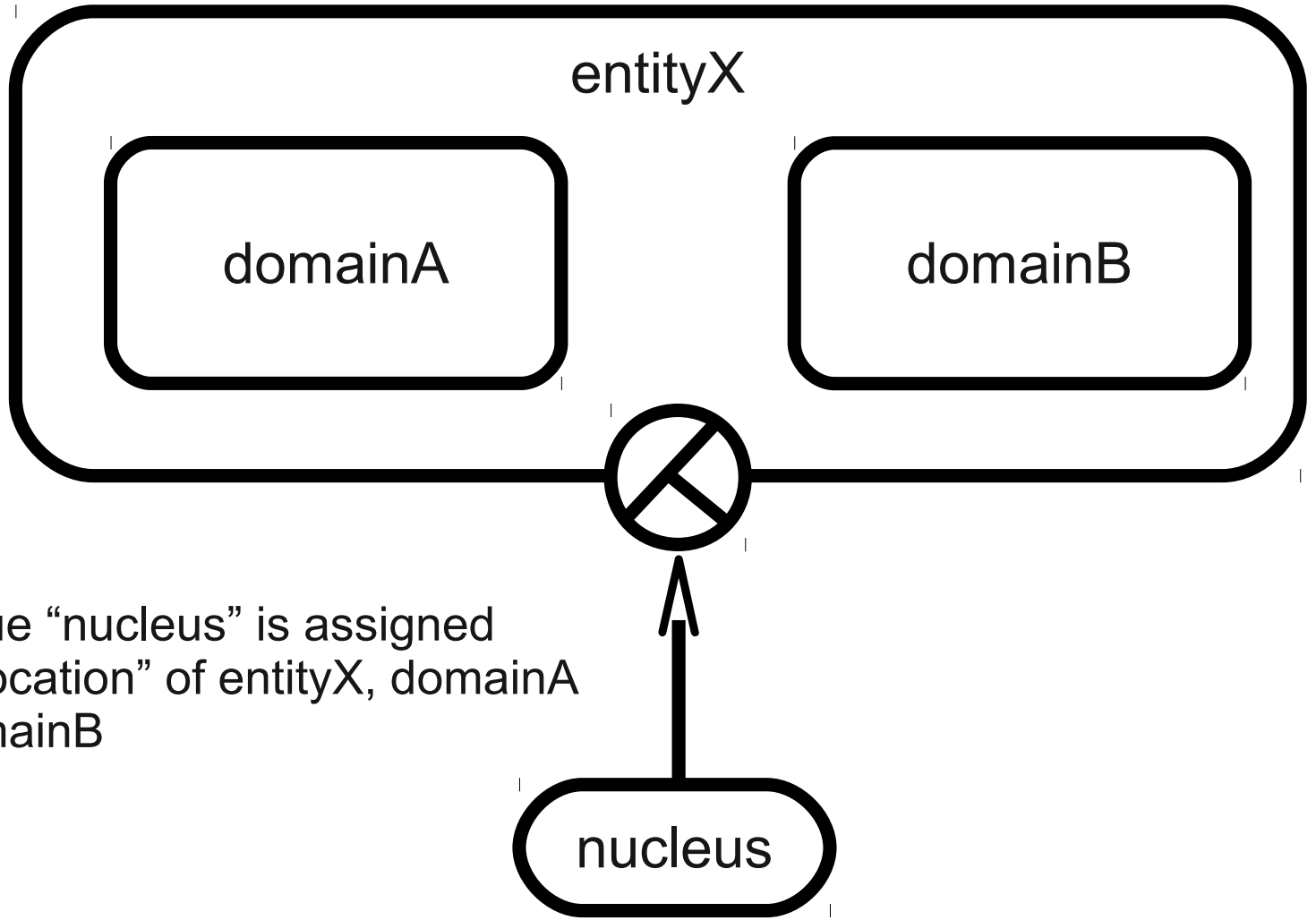
X interacts with Y



A of X interacts with Y

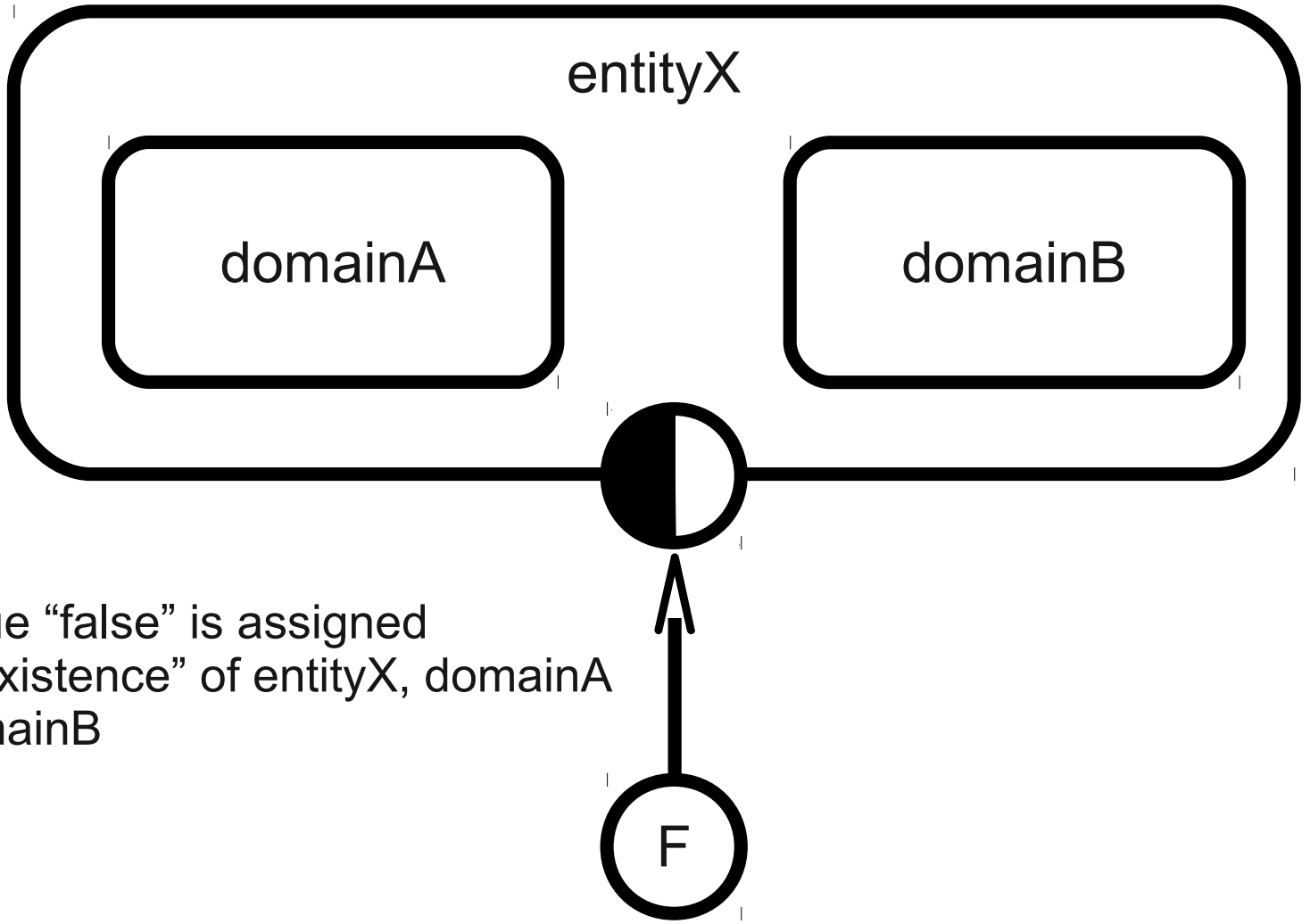


Translocation of X in the nucleus



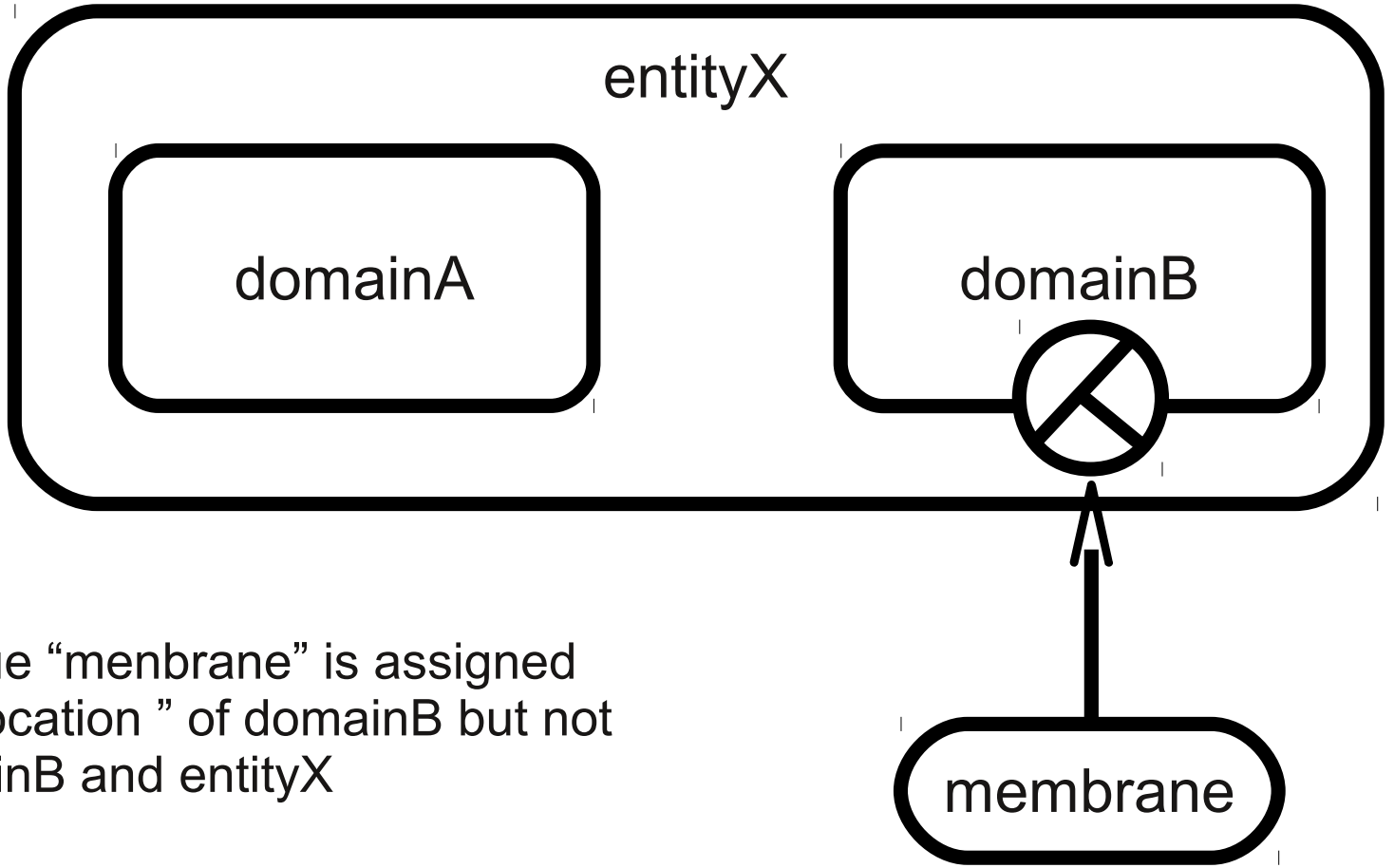
The value “nucleus” is assigned
to the “location” of entityX, domainA
and domainB

degradation of X



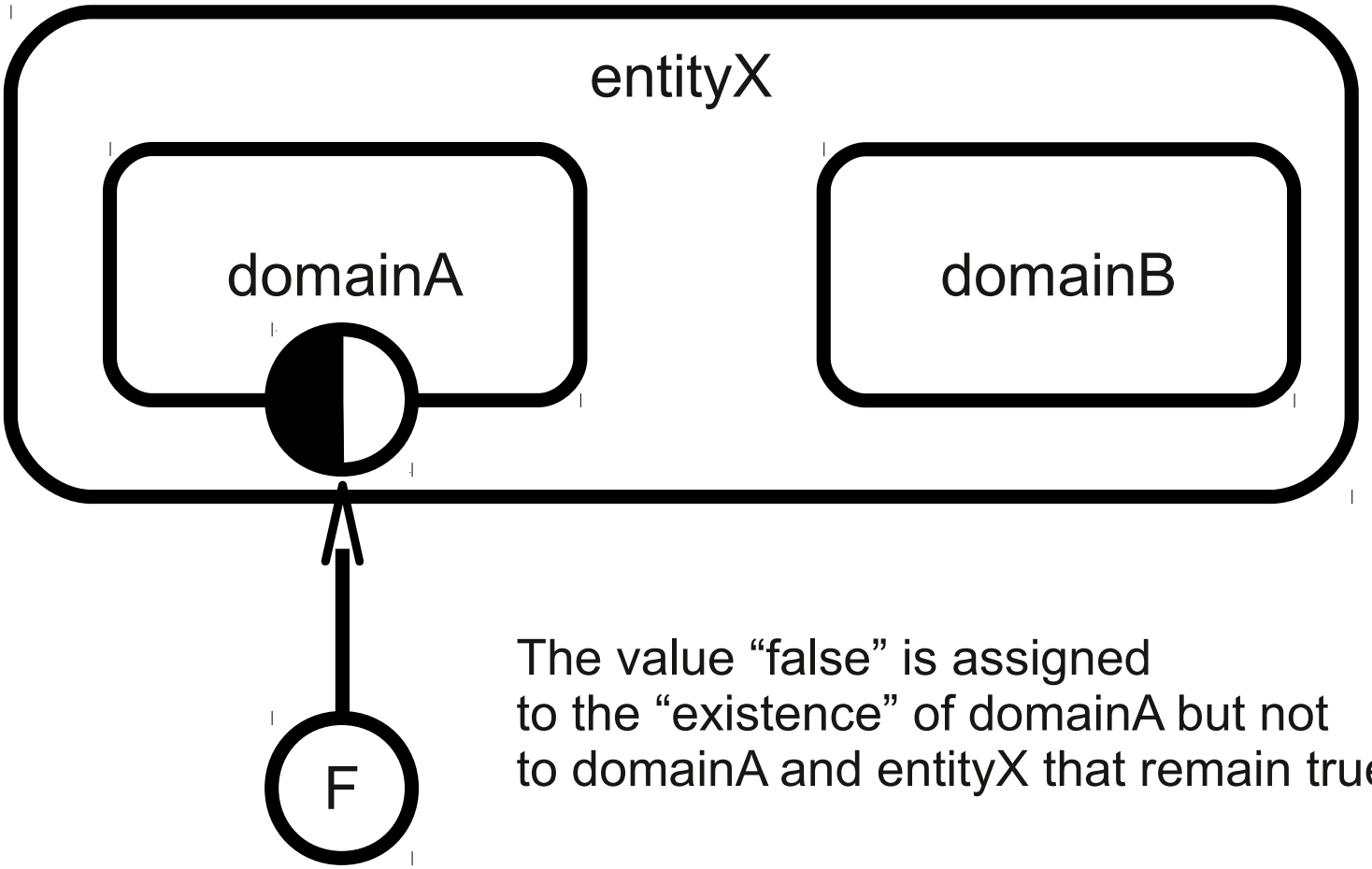
The value “false” is assigned
to the “existence” of entityX, domainA
and domainB

insertion of B of X in the membrane



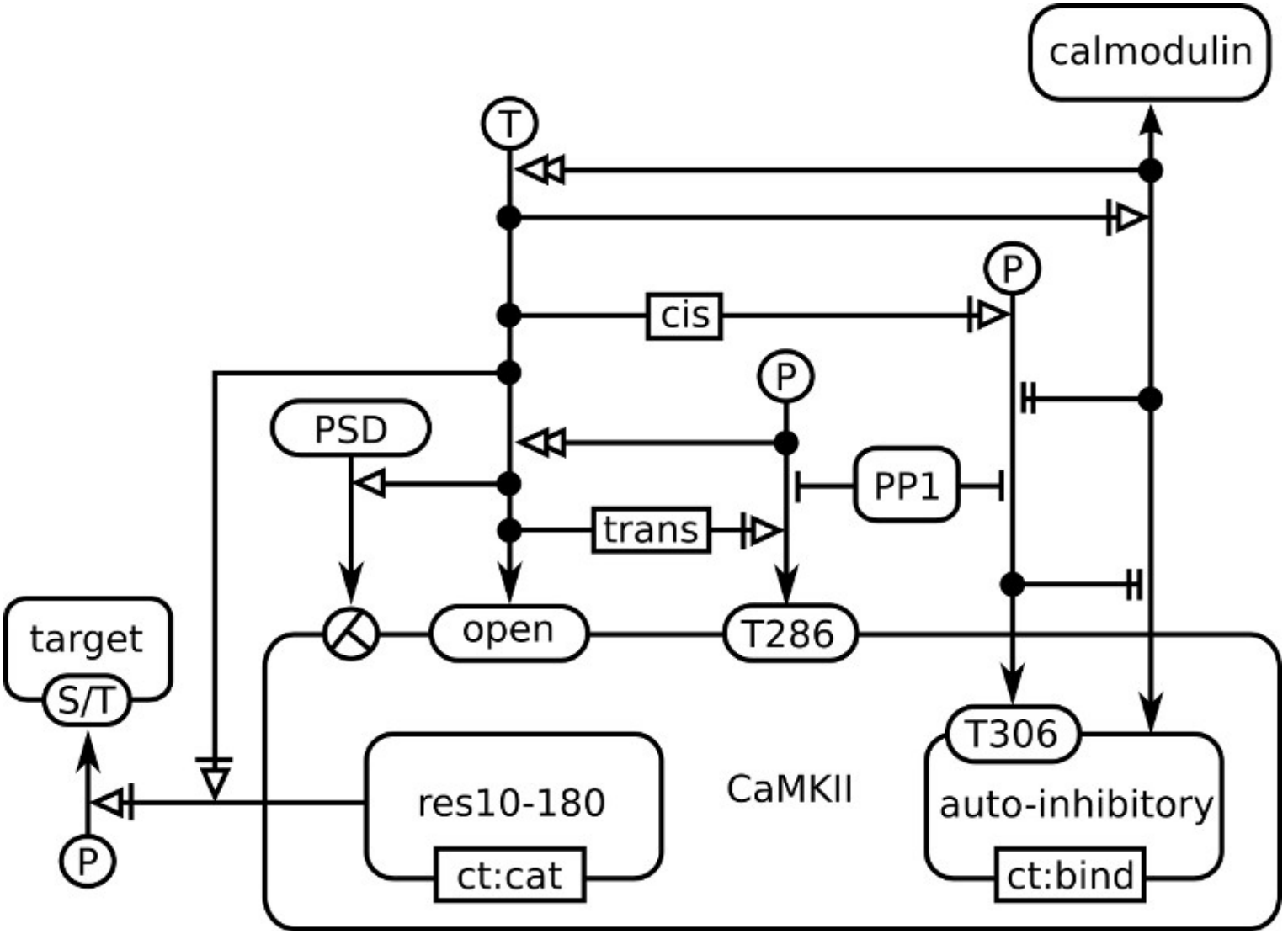
The value “menbrane” is assigned
to the “location ” of domainB but not
to domainB and entityX

degradation of domain A of X



The value “false” is assigned
to the “existence” of domainA but not
to domainA and entityX that remain true

Real example: CaMKII

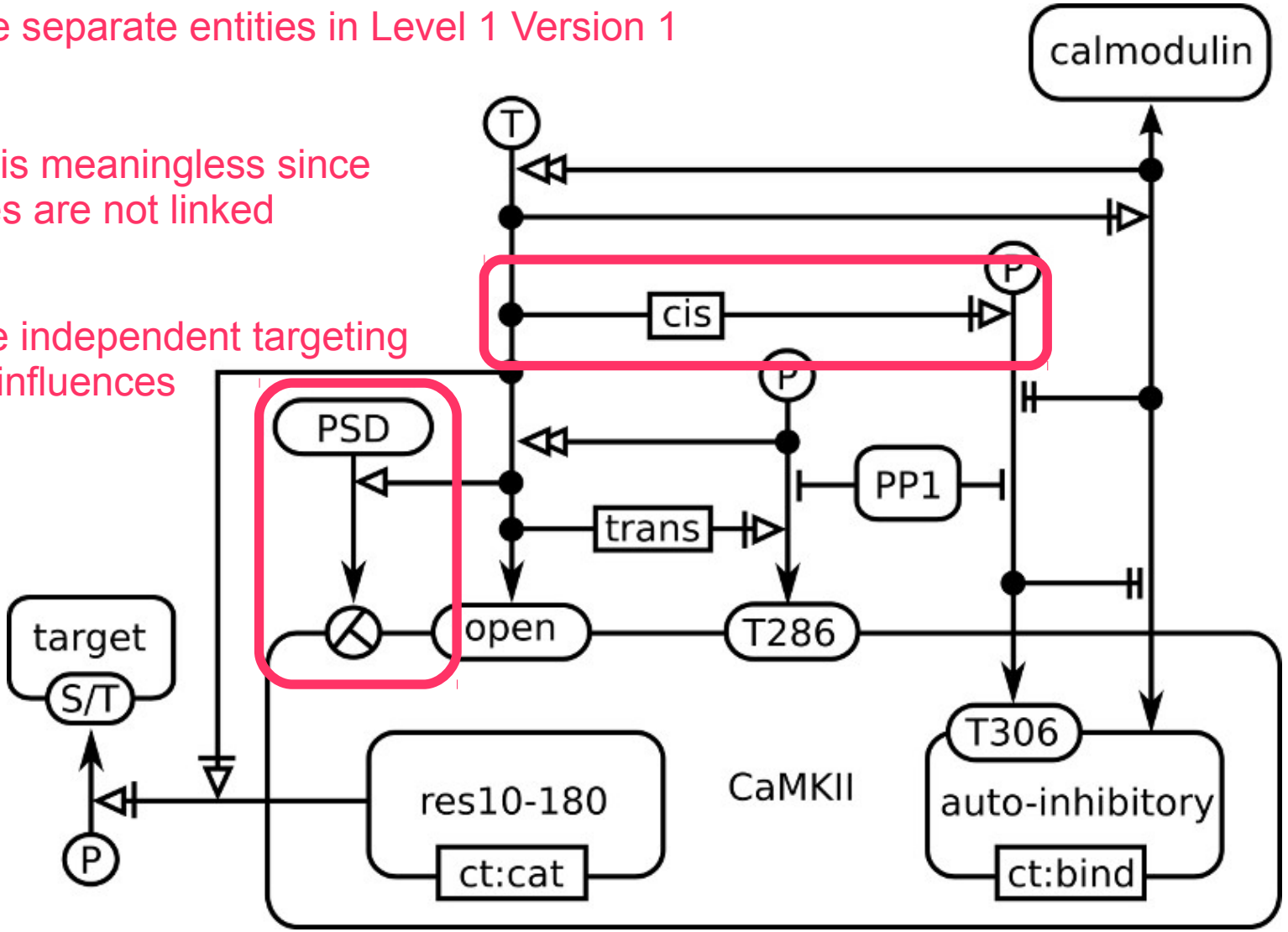


Real example: CaMKII

Three separate entities in Level 1 Version 1

"CIS" is meaningless since entities are not linked

Three independent targeting
With influences



Issues pending in HARMONY

1) Possibility to identify groups of entities and statements, for instance defining pathways [NLN]

2) Differentiating Entities (and outcomes) representing continuants and occurrents. Proposal is to follow PD and AF guidelines (round corners for continuants and acute ones for occurrents) [AL and NLN]

3) Outcomes on influences. Purpose is to differentiate the actualisation of an influence from the the effect of the influence [NLN]

Vote on groups

Question 1. Are-you in favour of introducing a "group" feature in SBGN languages?

Choice	Votes	Fraction
Yes	10	90.9%
No	1	9.1%
I do not know	0	0%.

Question 2: Should-we specify the way a group is displayed?

Choice	Votes	Fraction
Yes	7	63.6%
No	4	36.4%
I do not know	0	0%

Question 3: If we were to advise a way to represent groups, what should it be (multiple answers possible)?

Choice	Votes	Fraction
A spatial grouping	4	36.4%
A contour	7	63.6%
A background	8	72.7%
Highlighting glyps	4	36.4%
Unsure	2	18.2%
None of the above	0	0%

Vote on groups

Question 1. Are-you in favour of introducing a "group" feature in SBGN languages?

Choice	Votes	Fraction
Yes	**10**	**90.9%**
No	1	9.1%
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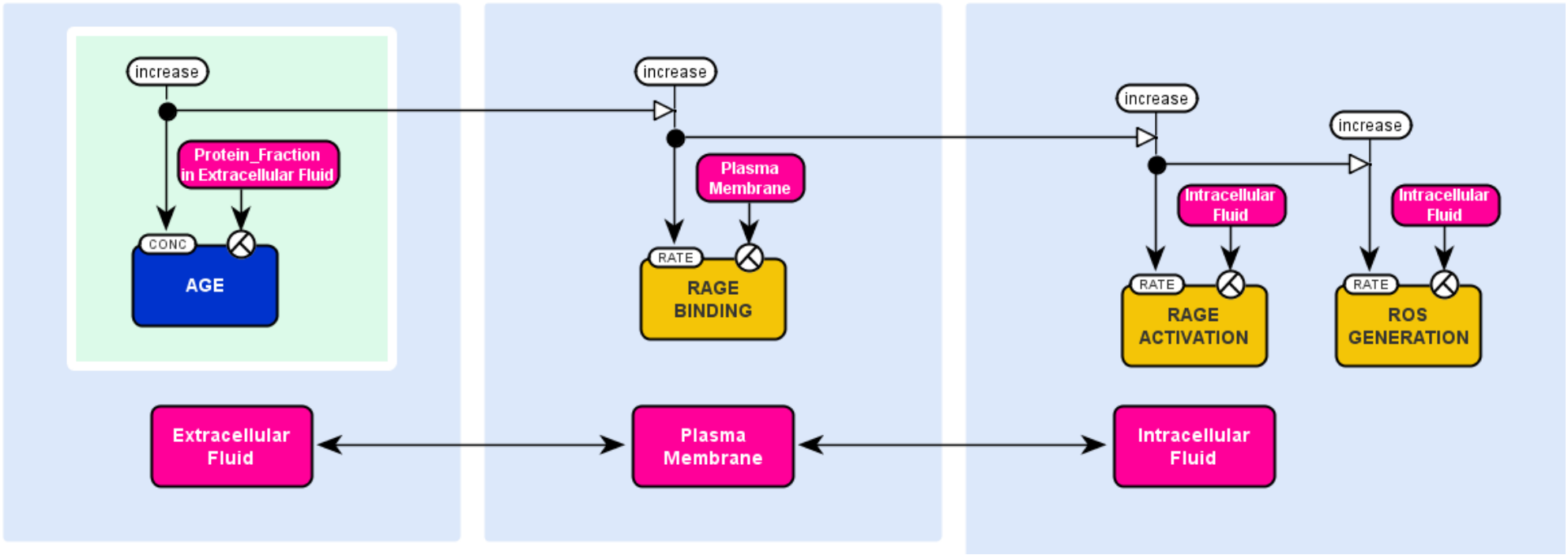
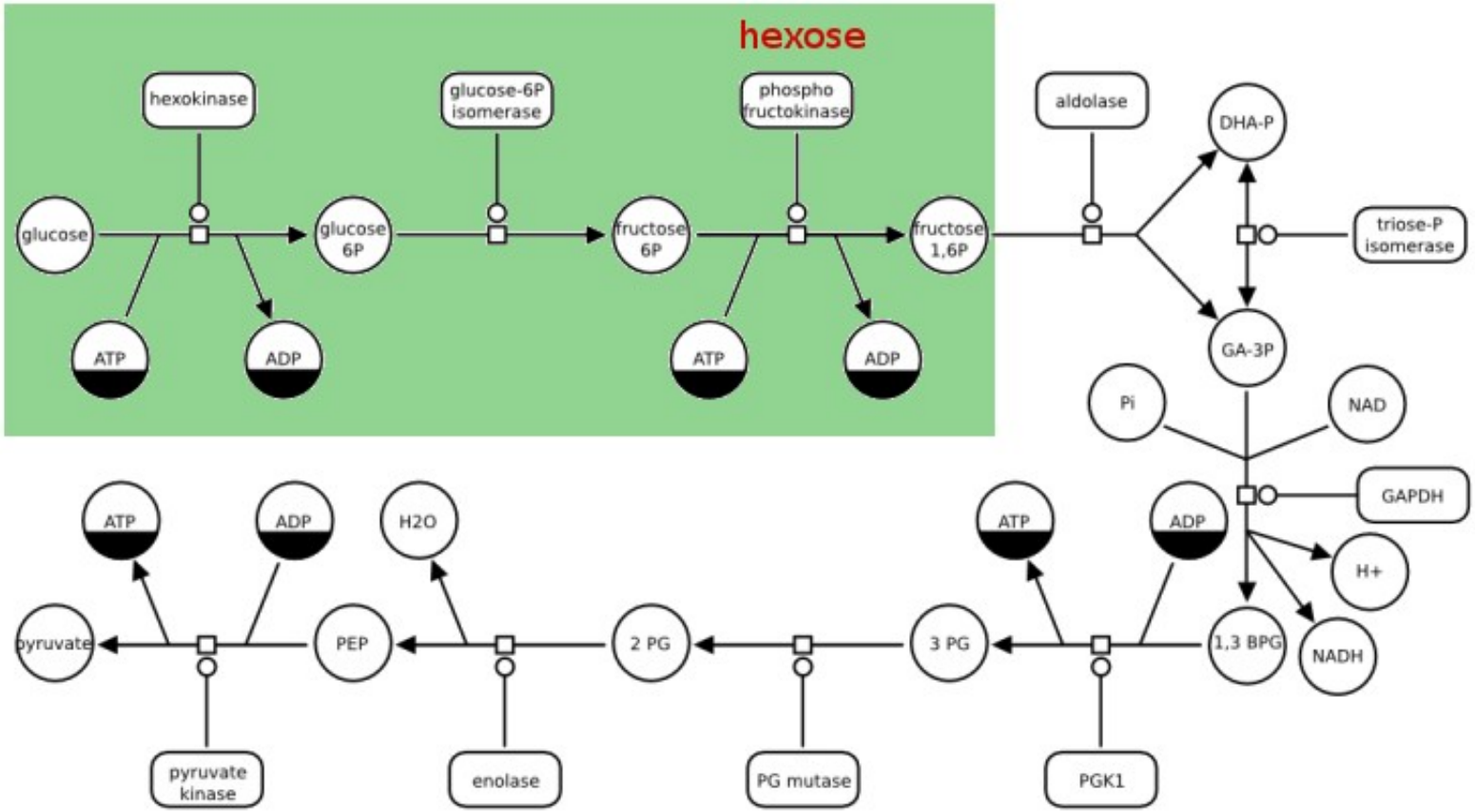
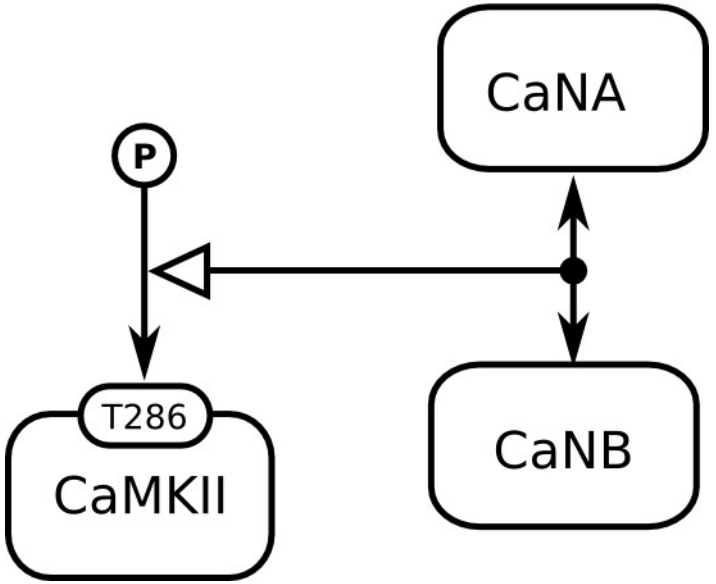
A background	**8**	**72.7%**
Highlighting glyphs	4	36.4%
Unsure	2	18.2%
None of the above	0	0%

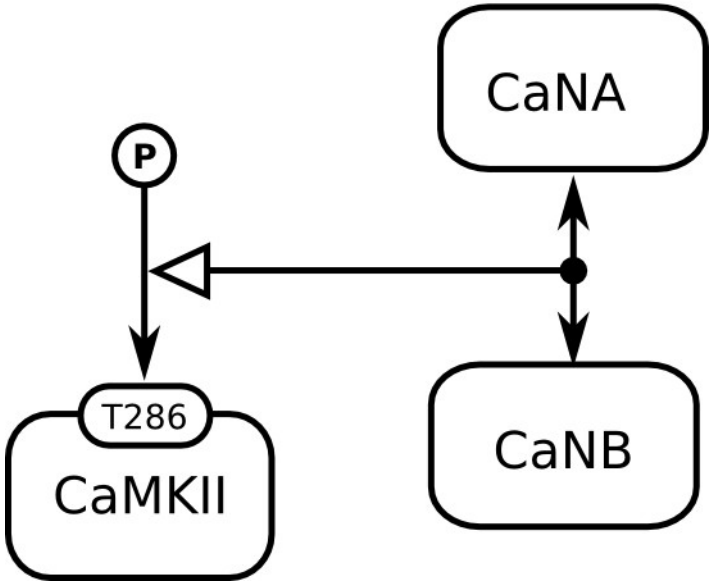

increase
Protein_Fraction in Extracellular Fluid
CONC
AGE
increase
Plasma Membrane
RATE
RAGE BINDING
increase
Intracellular Fluid
RATE
RAGE ACTIVATION
increase
Intracellular Fluid
RATE
ROS GENERATION
Extracellular Fluid
Plasma Membrane
Intracellular Fluid

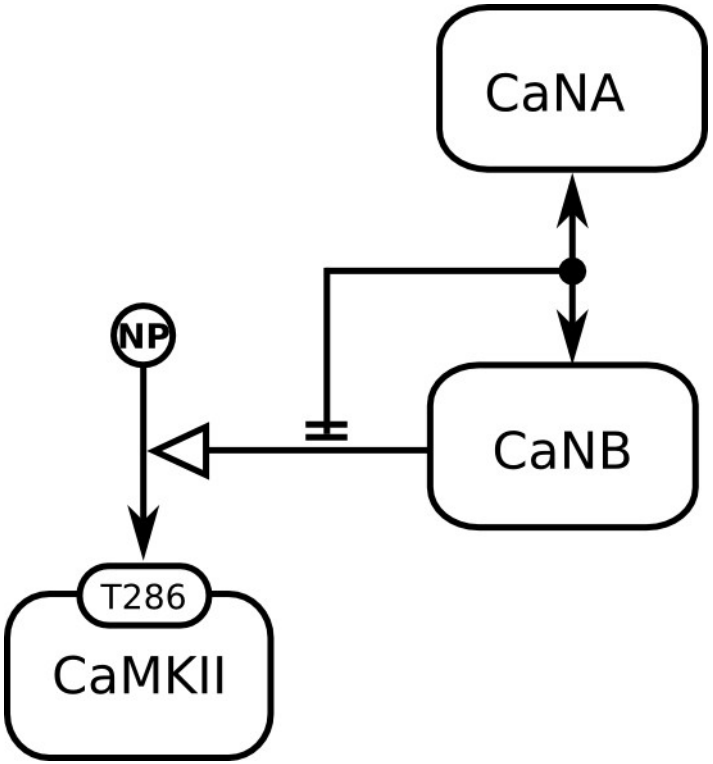

hexose
hexokinase
glucose-6P isomerase
phospho fructokinase
aldolase
DHA-P
triose-P isomerase
glucose
glucose 6P
fructose 6P
fructose 1,6P
ATP
ADP
ATP
ADP
GA-3P
Pi
NAD
GAPDH
H+
NADH
ATP
ADP
H2O
ATP
ADP
1,3 BPG
3 PG
2 PG
PEP
pyruvate
pyruvate kinase
enolase
PG mutase
PGK1

Continuant Vs occurrent outcomes

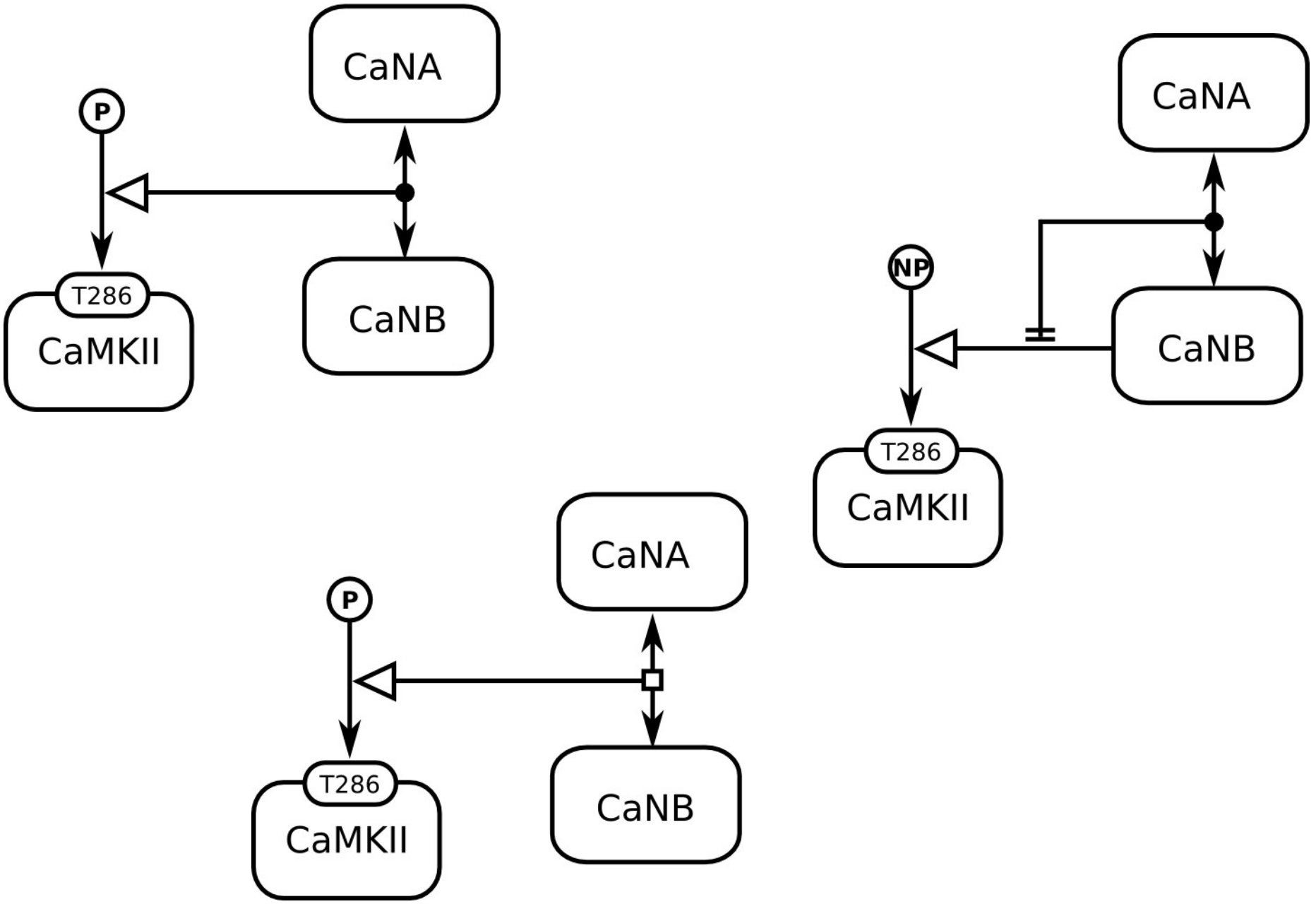


Continuant Vs occurrent outcomes

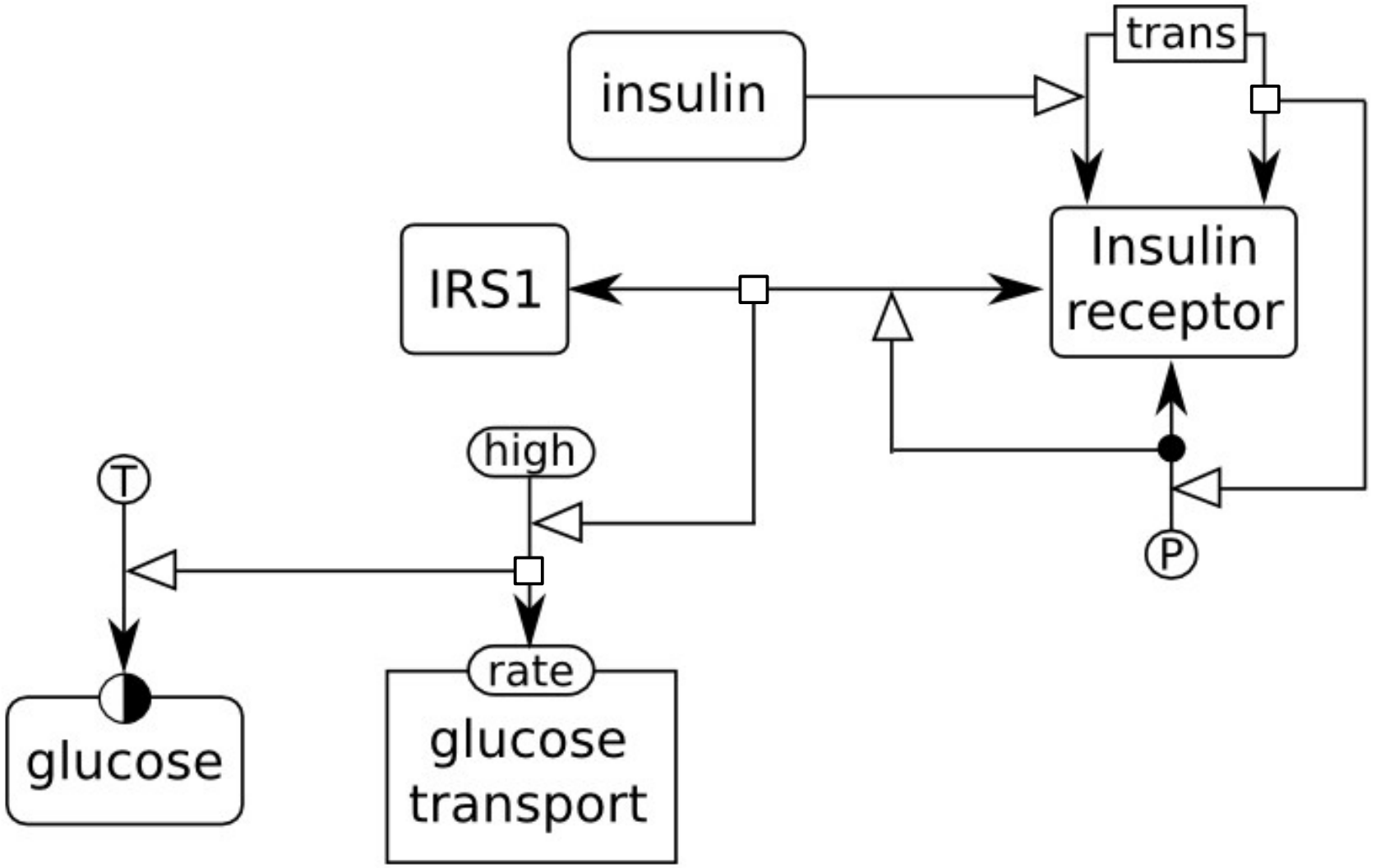




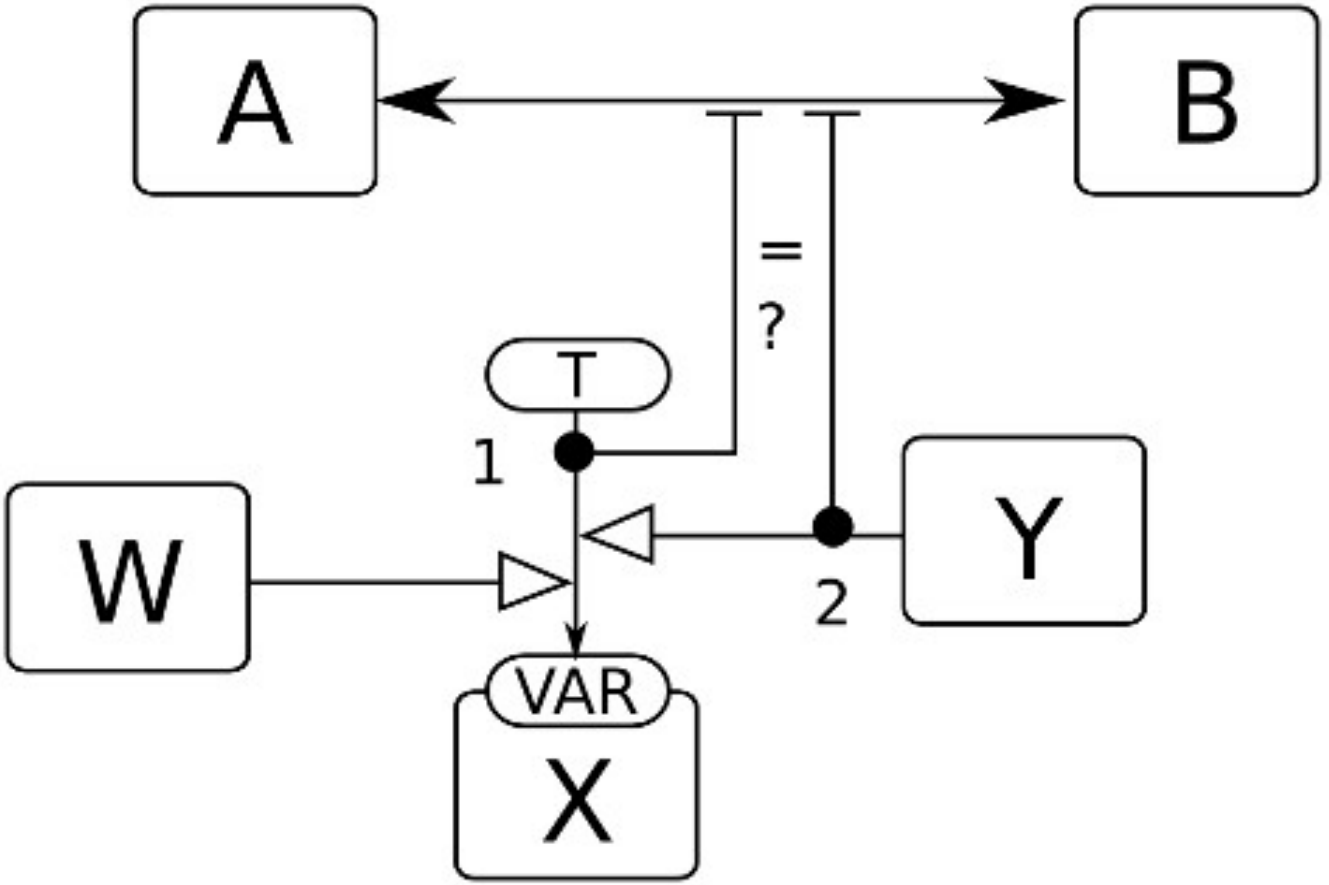
Continuant Vs occurrent outcomes



Continuant Vs occurrent entities



Outcome on influences



Better representation of rule-based models

Any other issue you want to discuss?