RUB

Case Study 2

Relational concepts and grounding

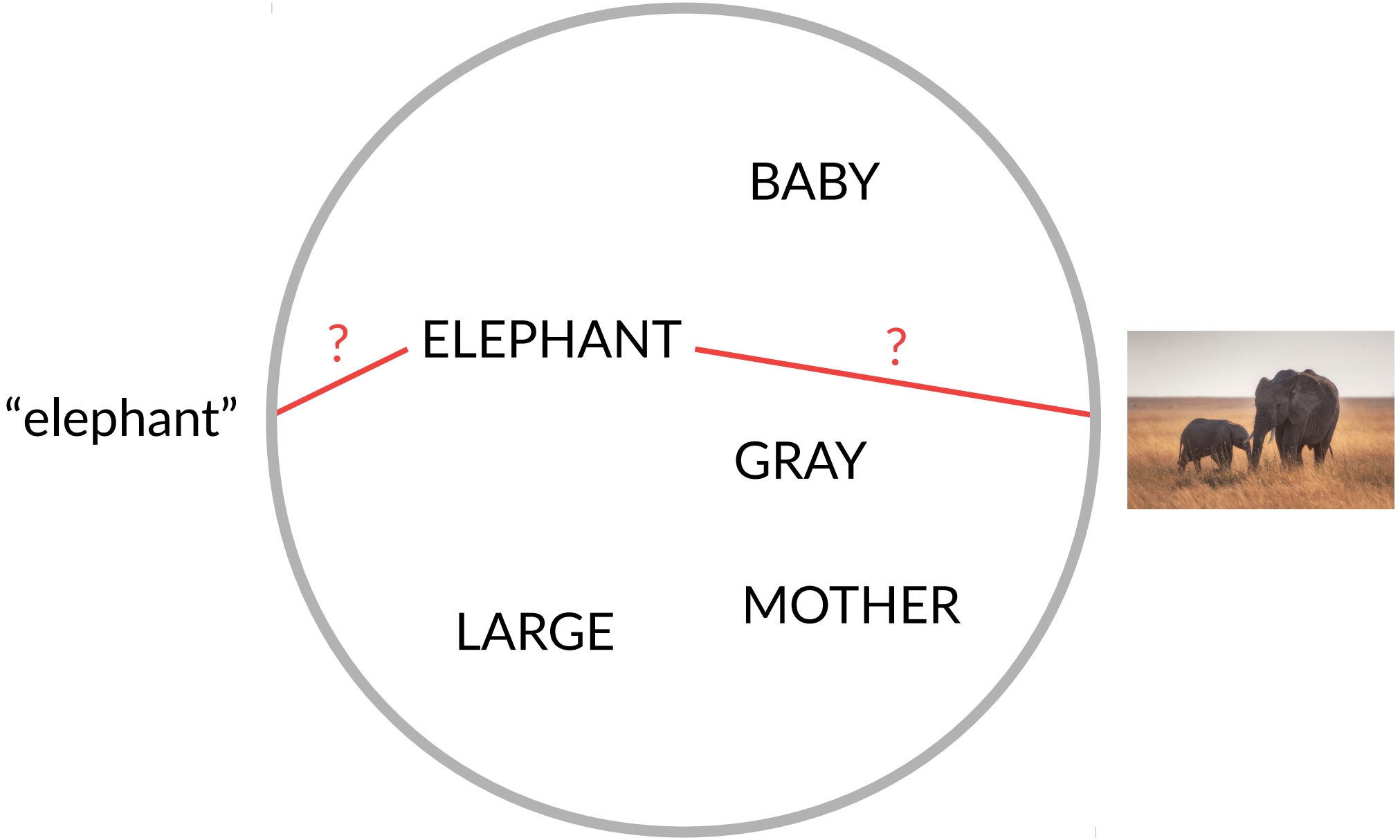
Mathis Richter

Grounding

Describing

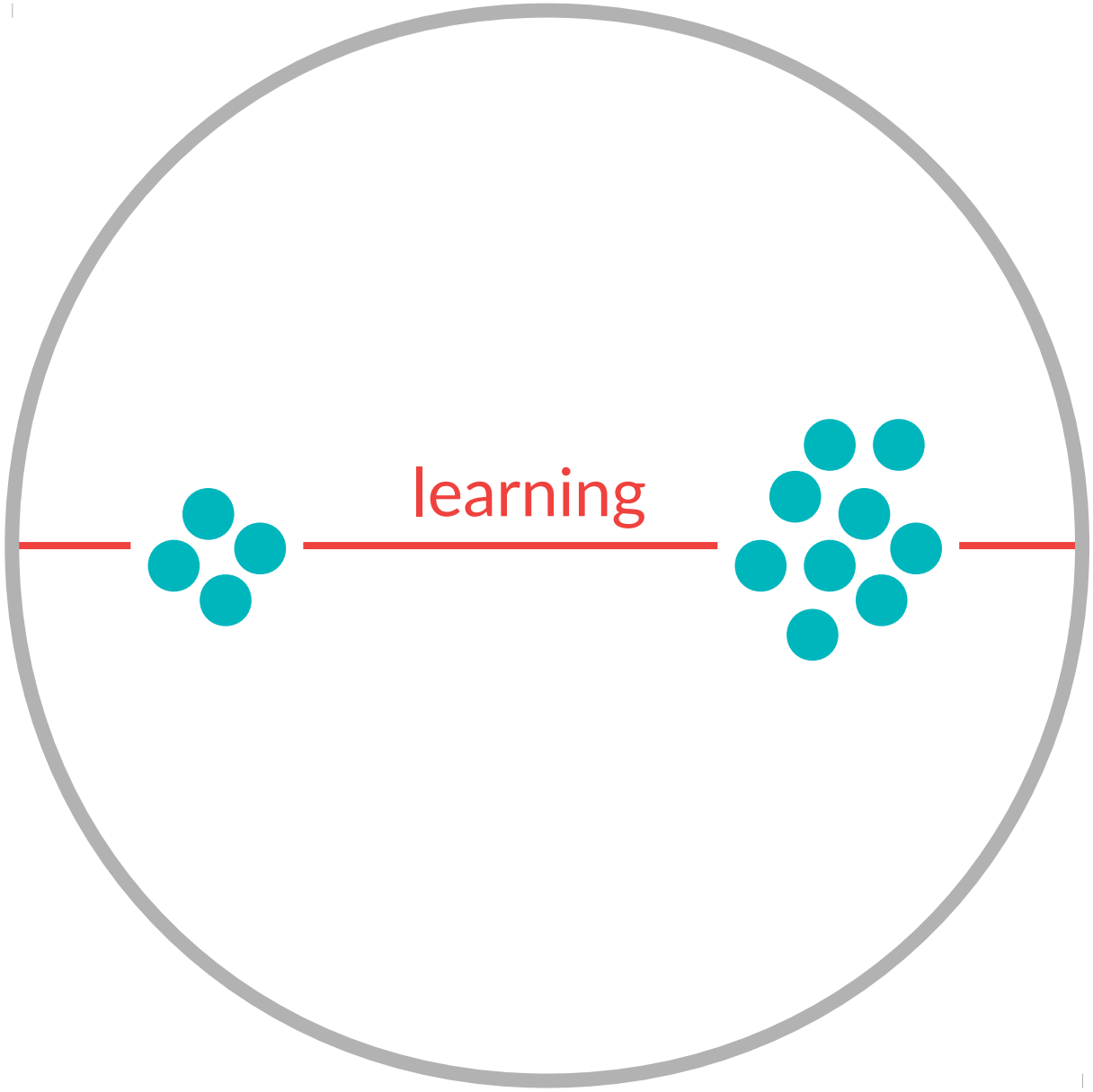
A baby elephant is walking toward its mother

Grounding



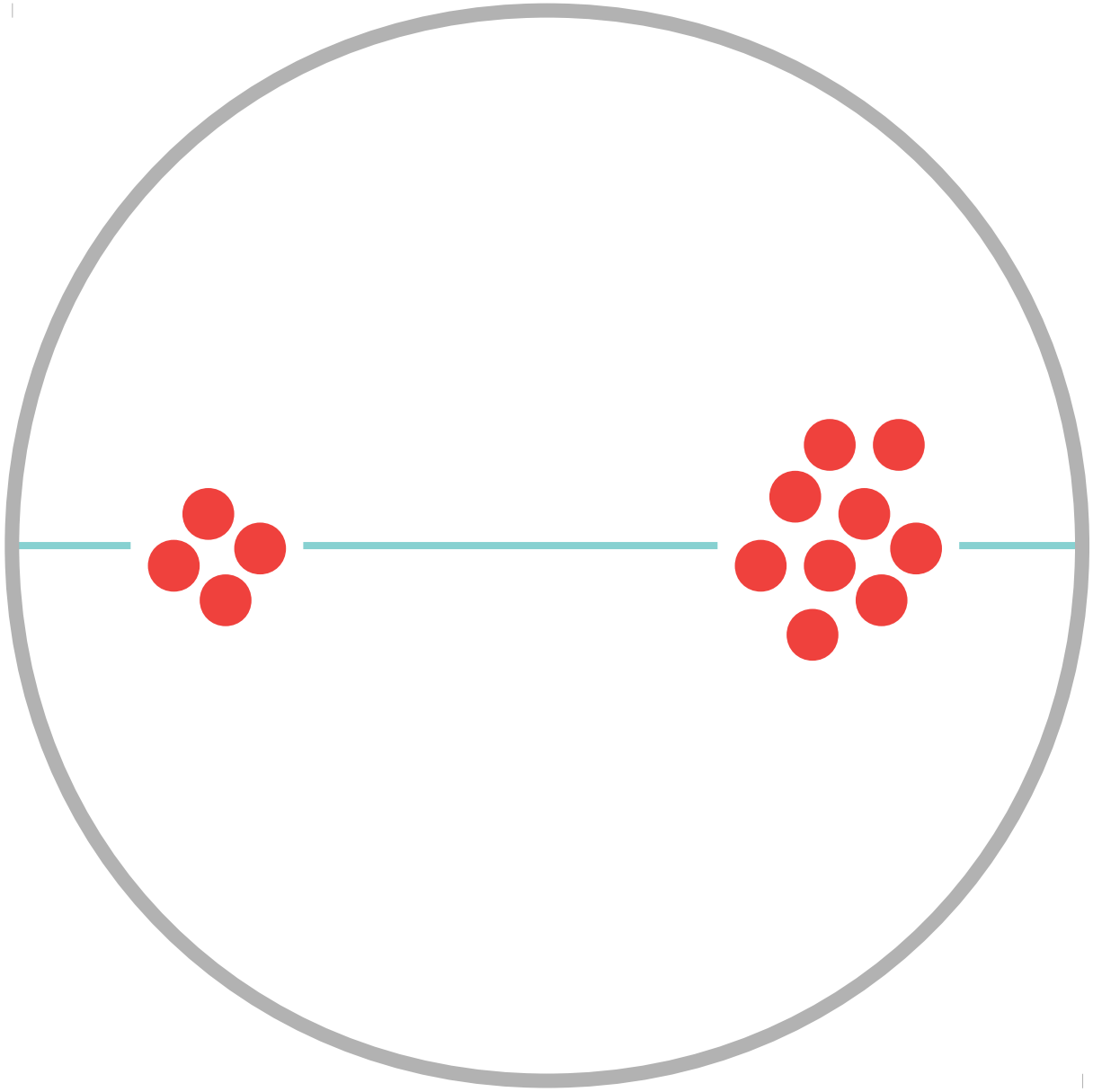
Grounding

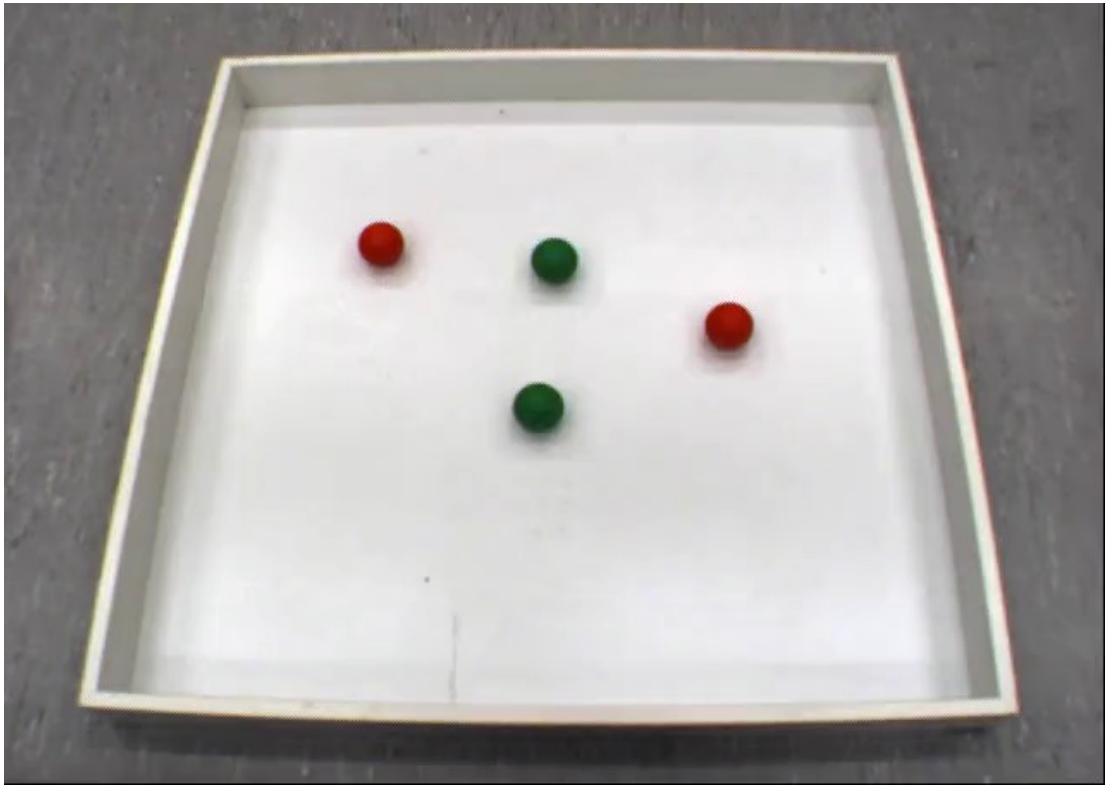
“elephant”



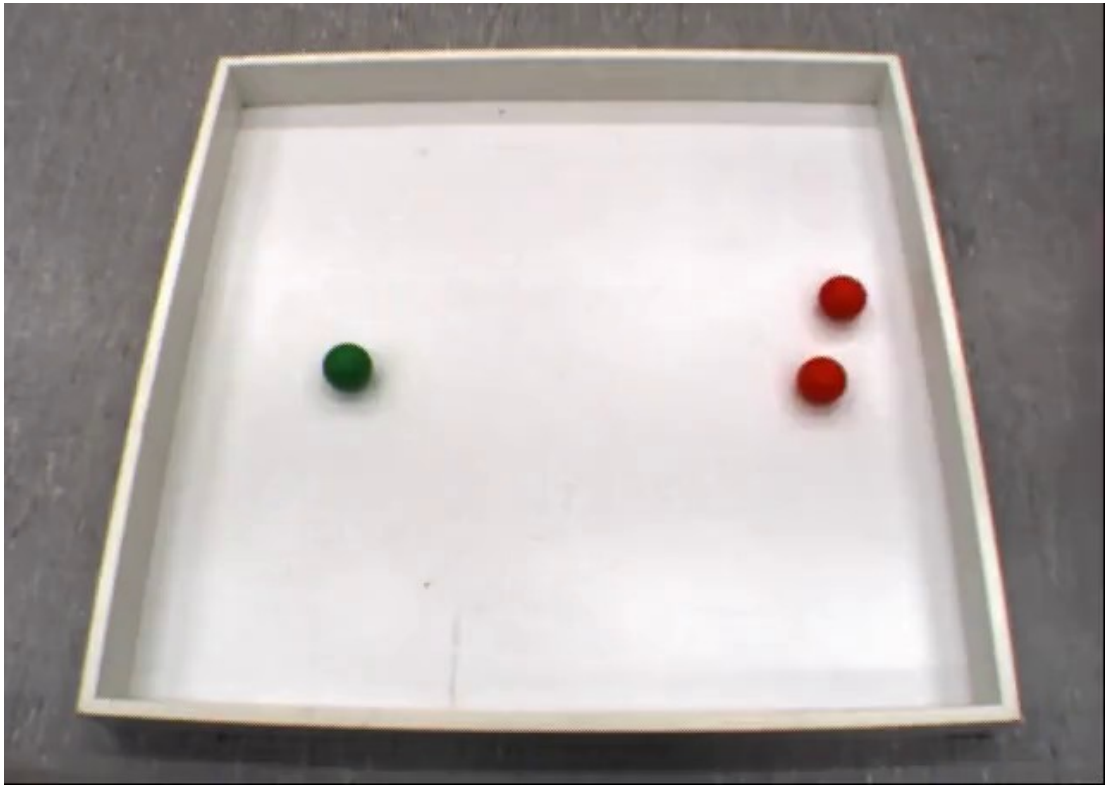
Perceptual grounding

“elephant”

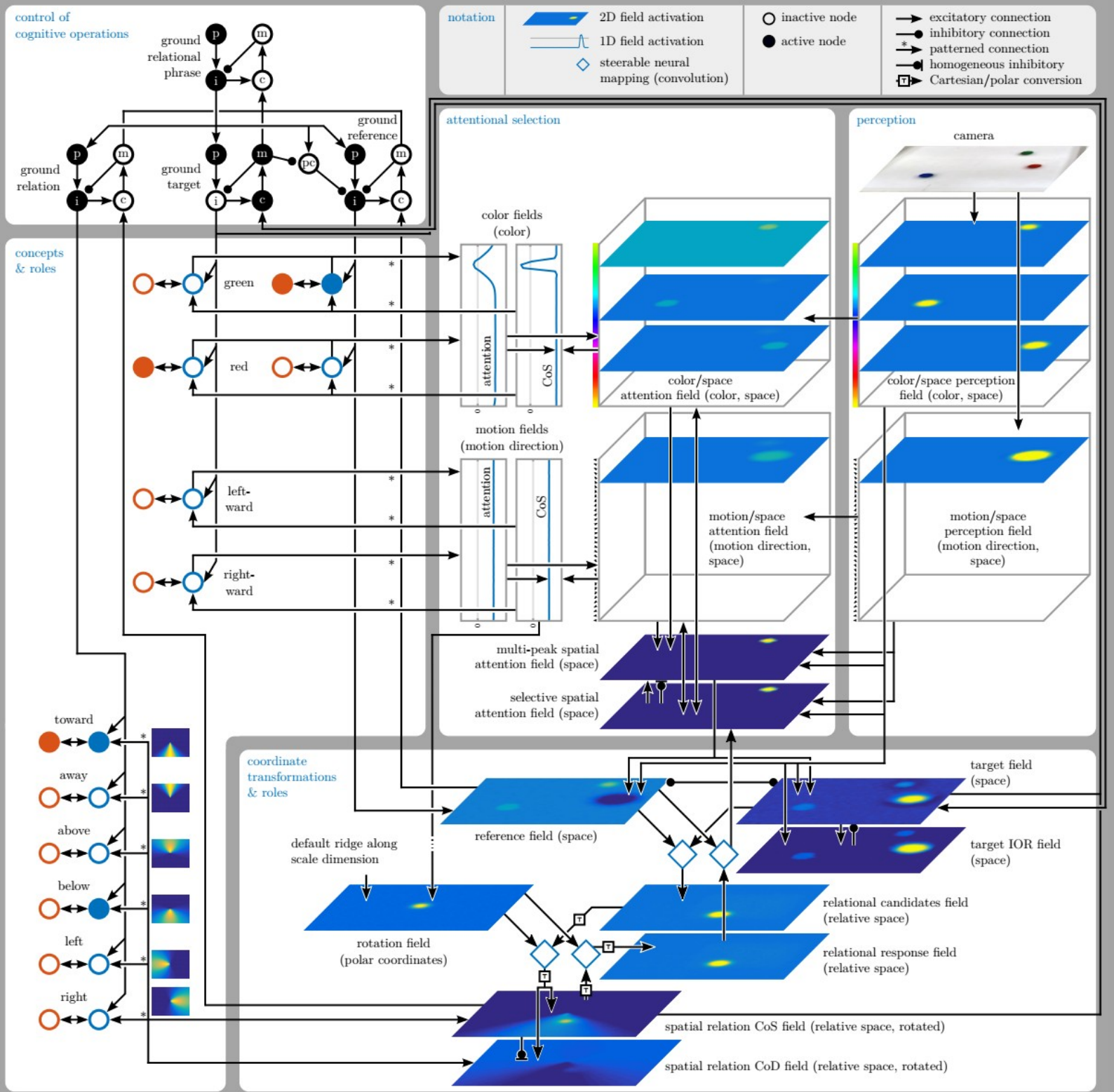




The red object to the left of the green object.

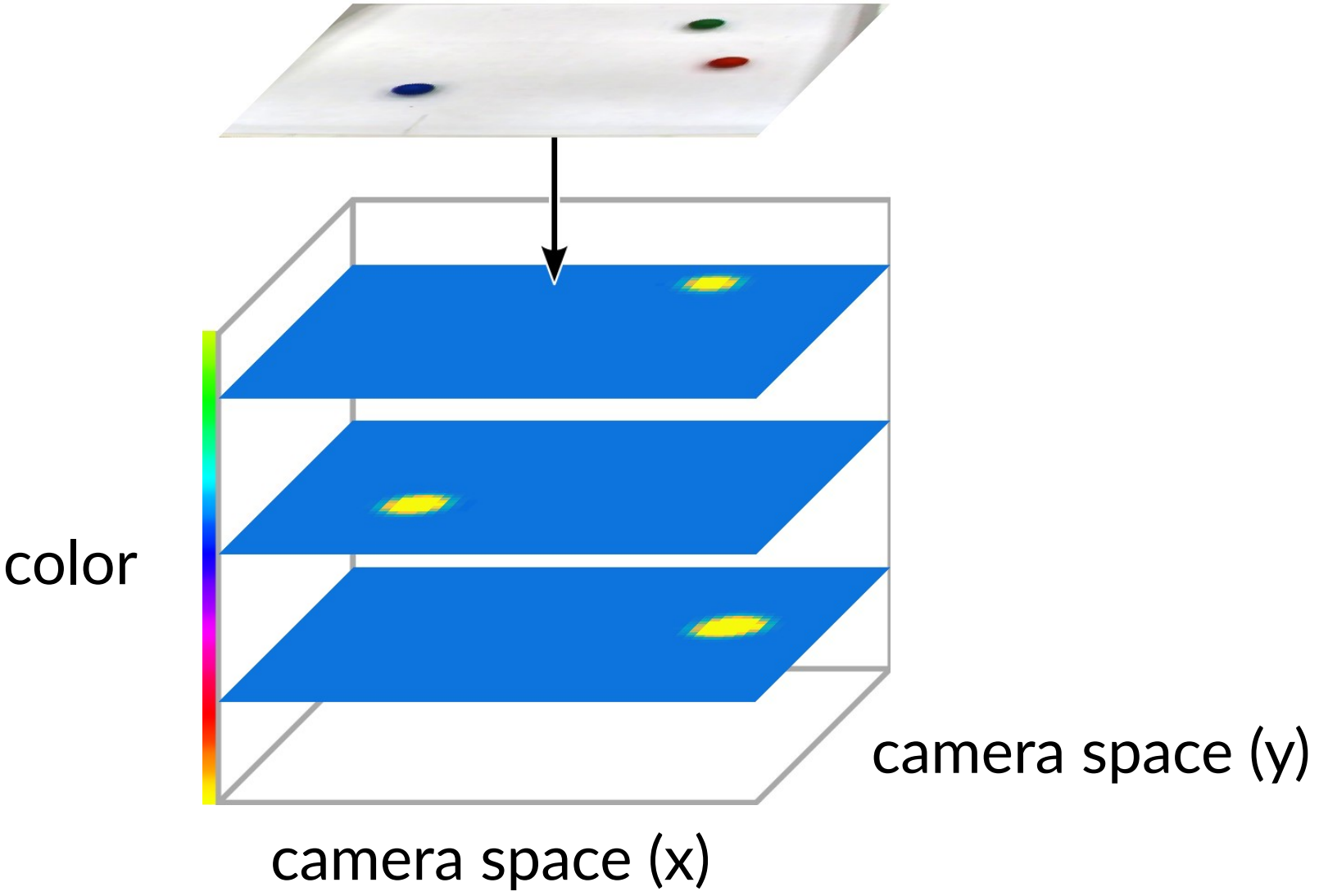


The red object moving toward the green object.

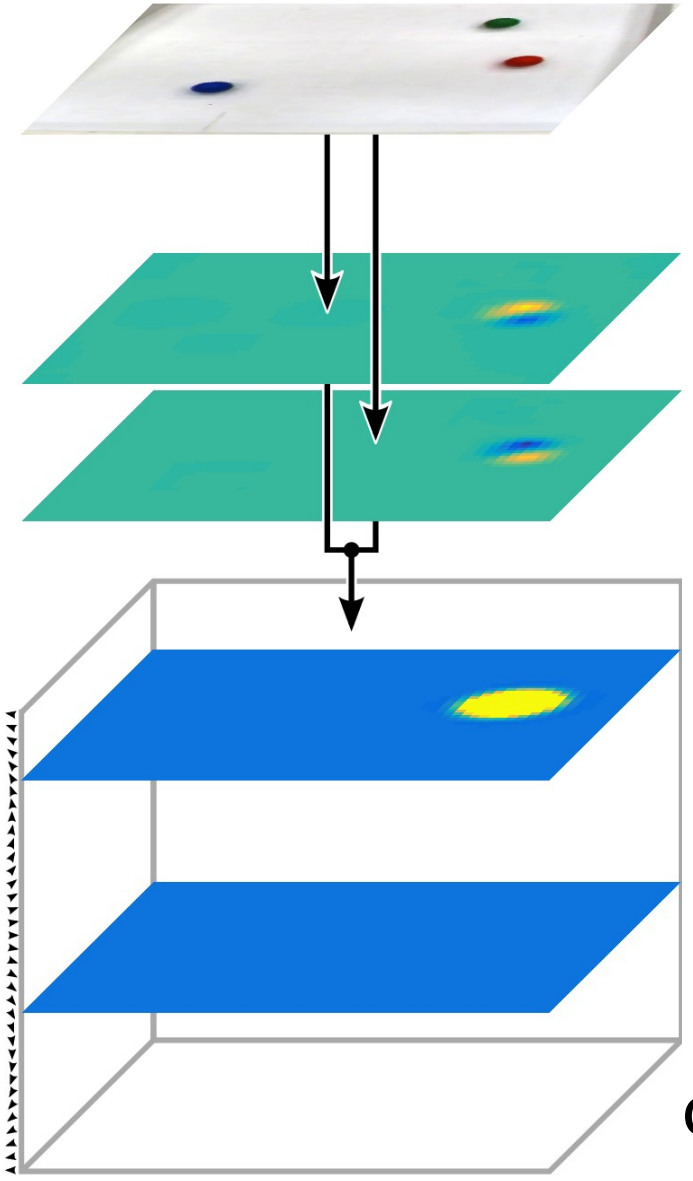


Richter, Lins, Schöner (Top Cogn Sci, 2017)

Perceptual input



Perceptual input



movement detection (transient detectors)

movement direction

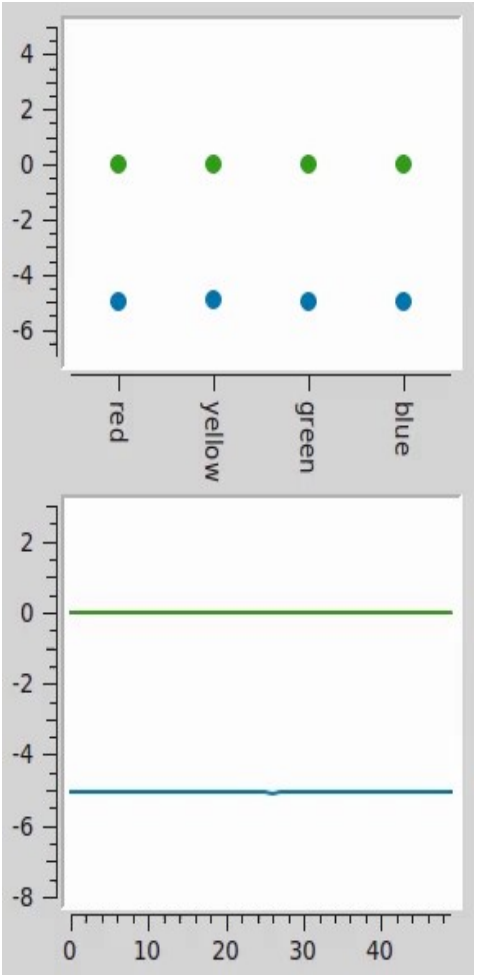
camera space (y)

camera space (x)

Categorical color concepts

color categories

color field



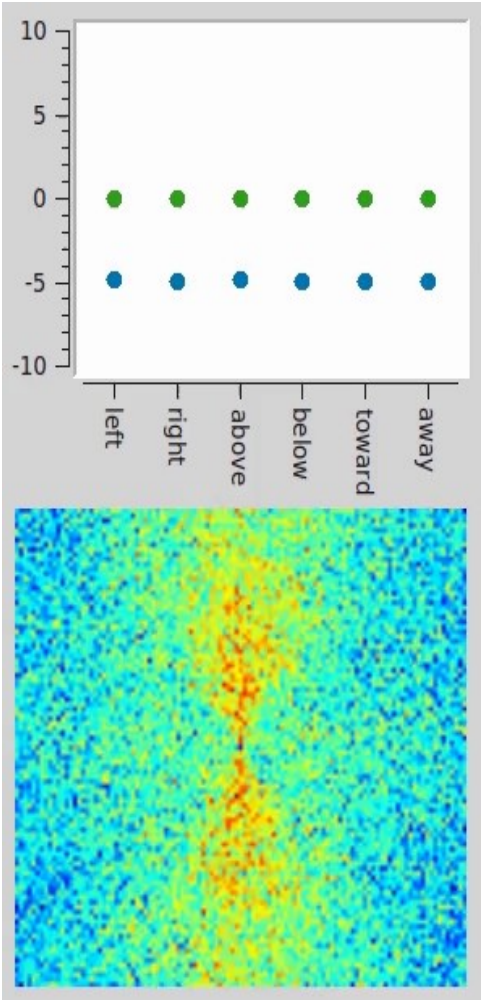
output

activation

Categorical relation concepts

categorical relation concepts

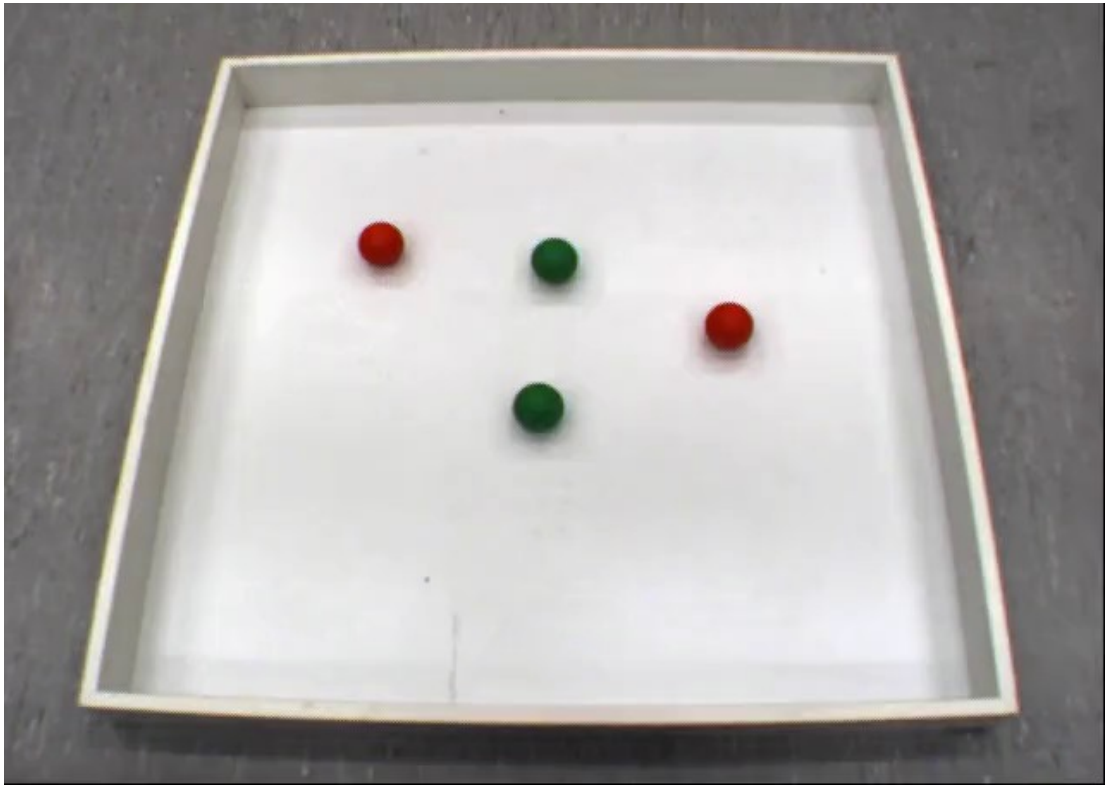
relation field



output

activation

Roles



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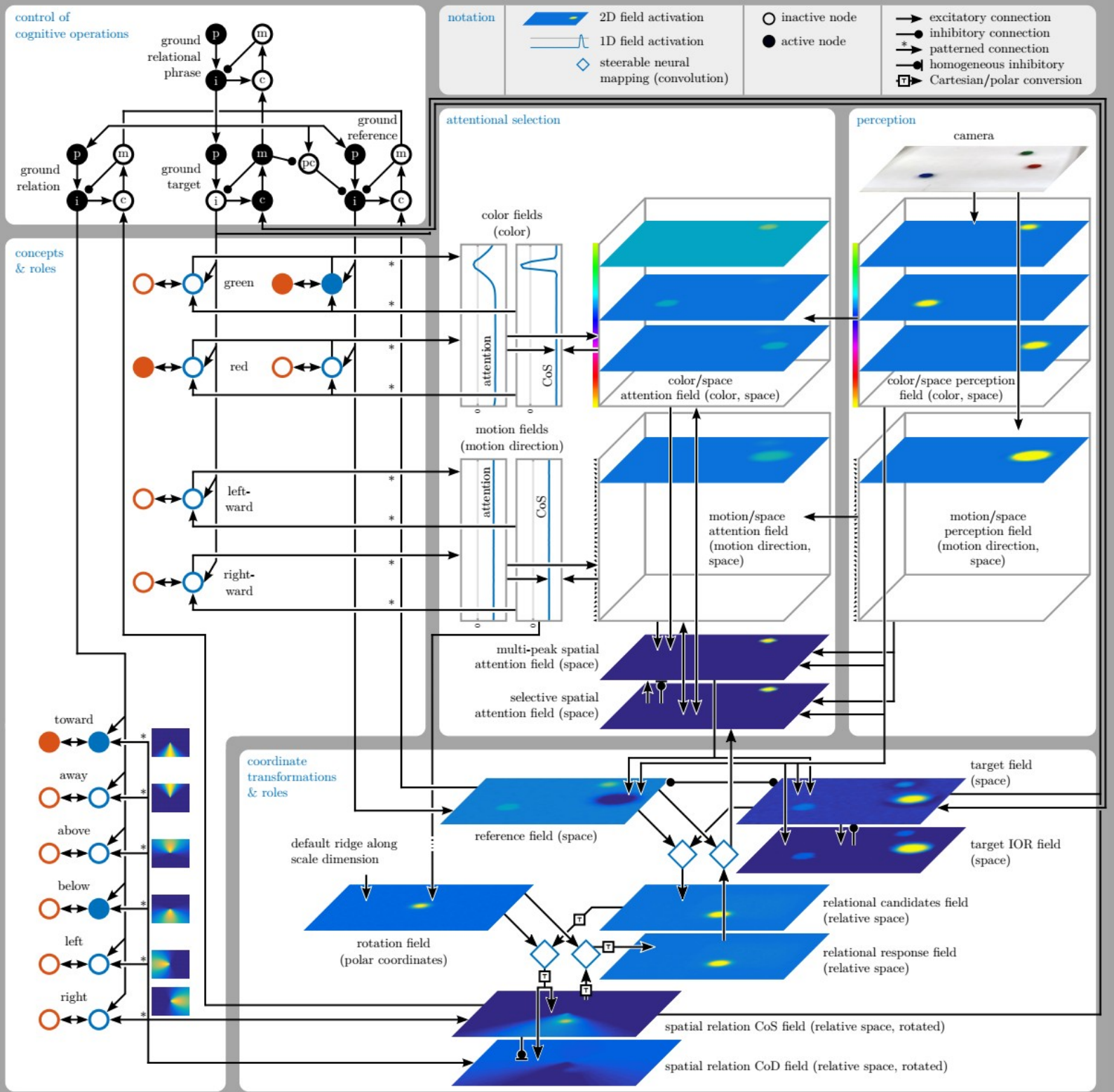
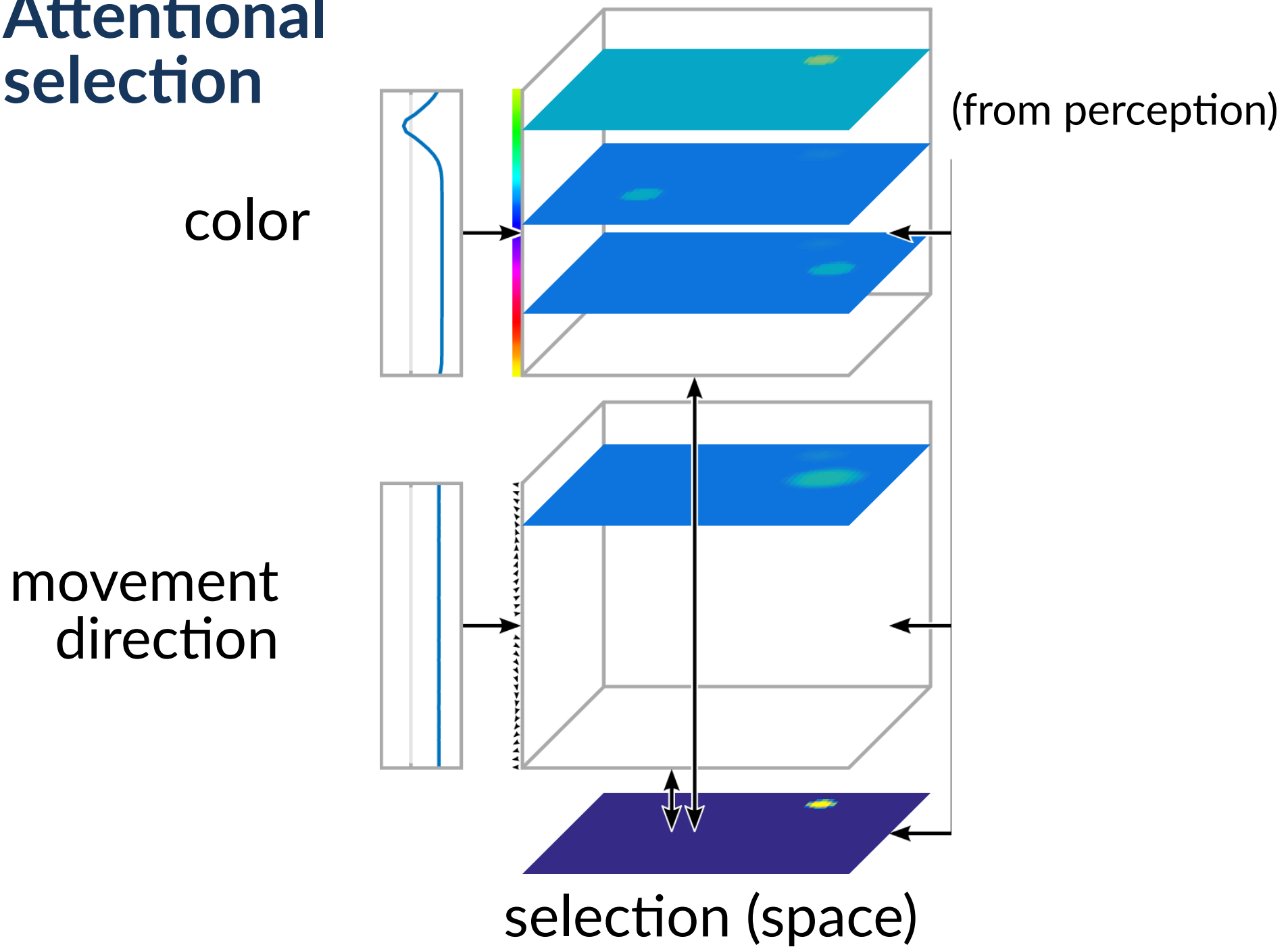


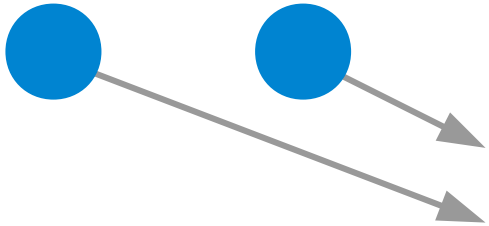
Richter, Lins, Schöner (Top Cogn Sci, 2017)

Attentional selection

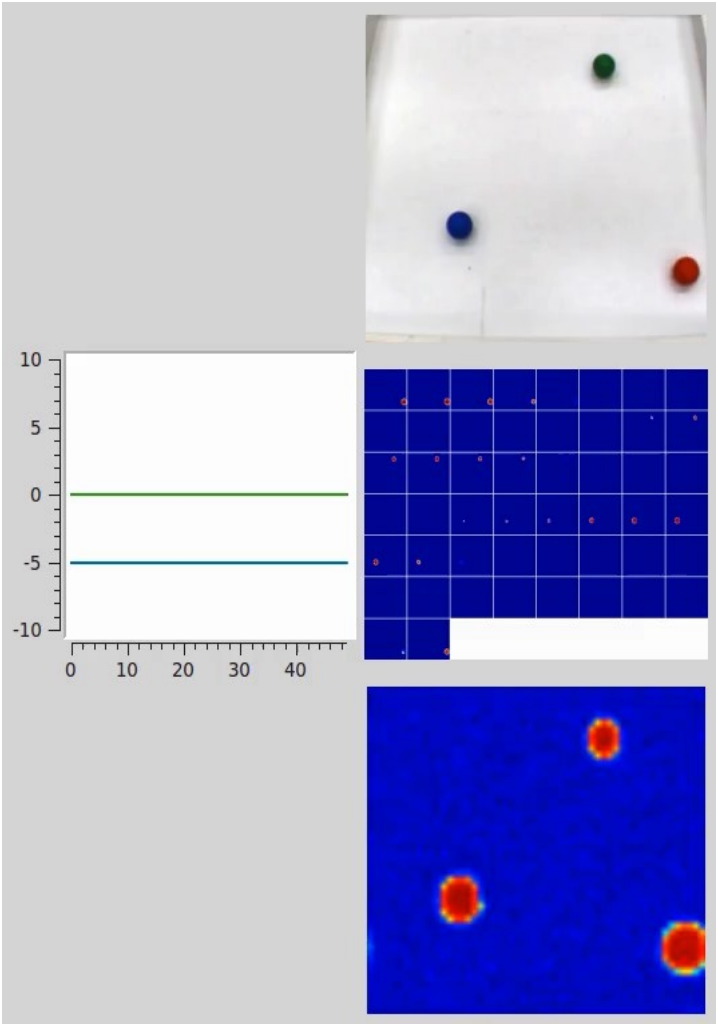


Attentional selection

“green” “blue”



color field



video

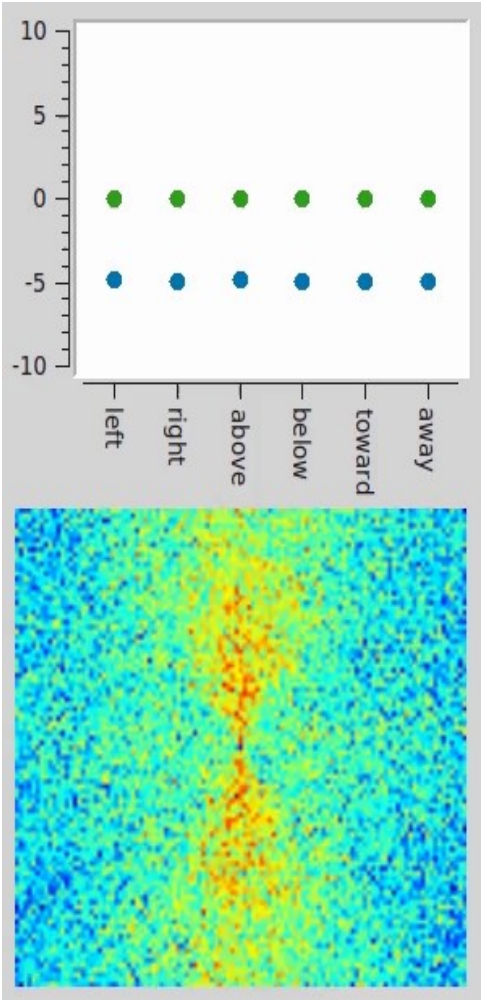
selection (color space)

selection (space)

Categorical relation concepts

categorical relation concepts

relation field



output

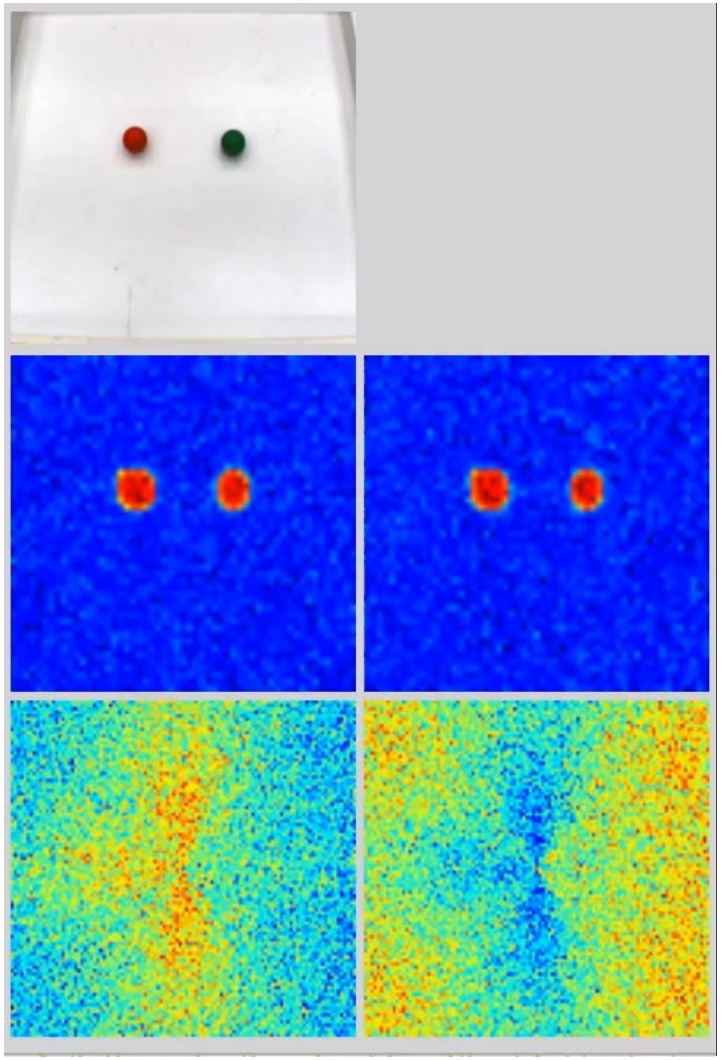
activation

Coordinate transformation

video

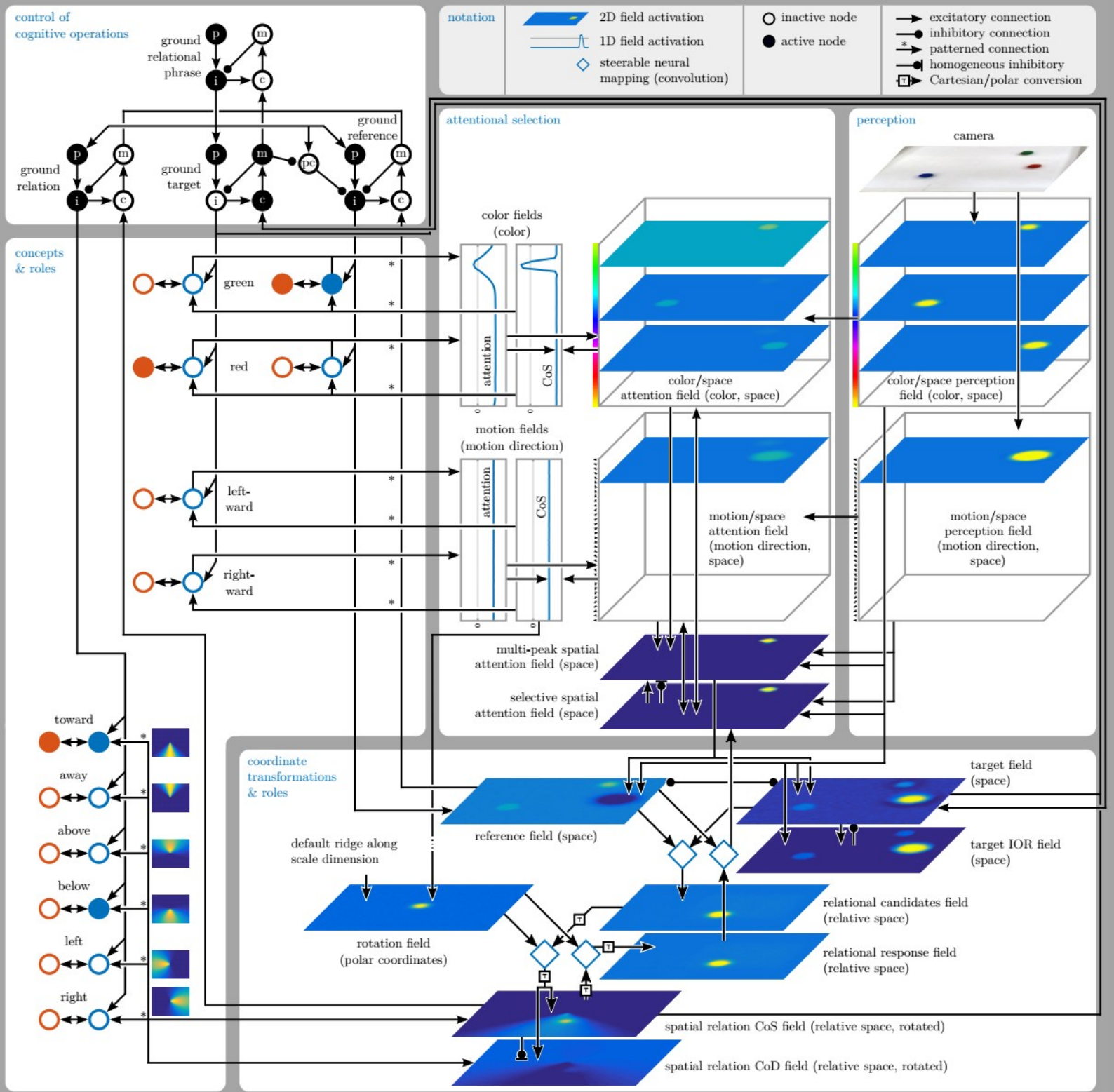
target object

match field



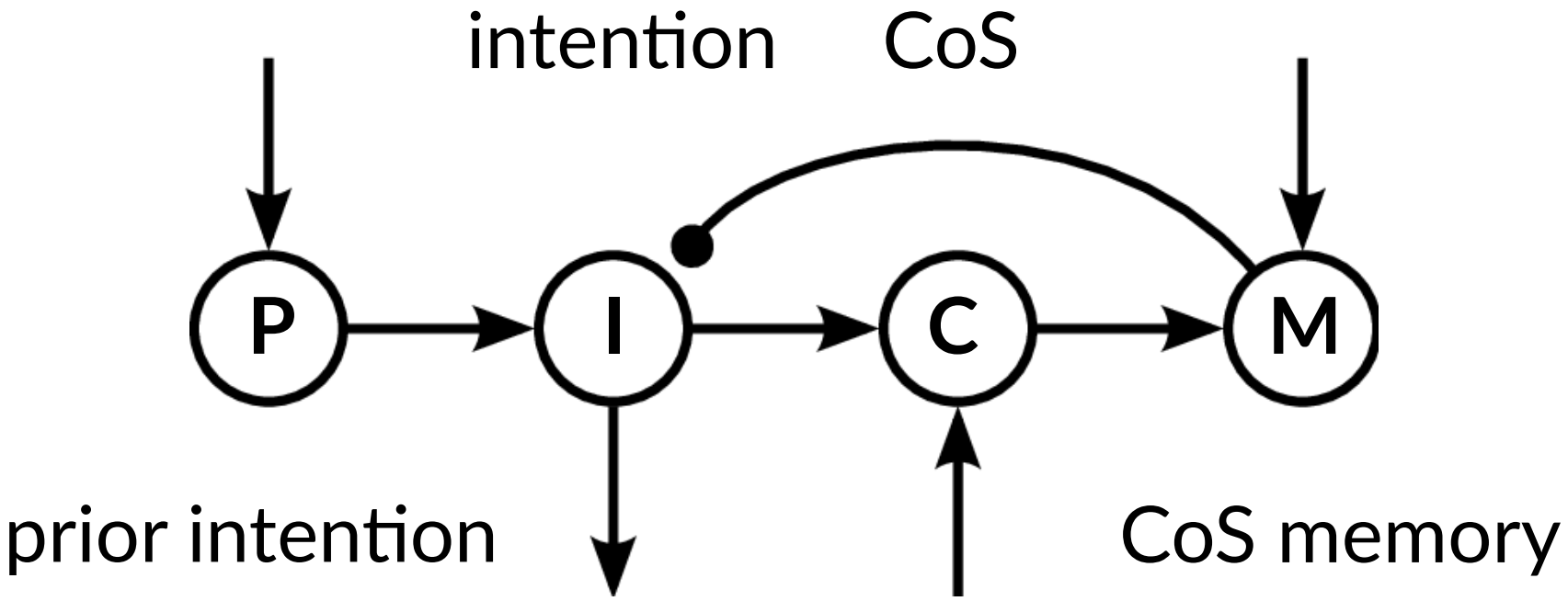
reference object

mismatch field

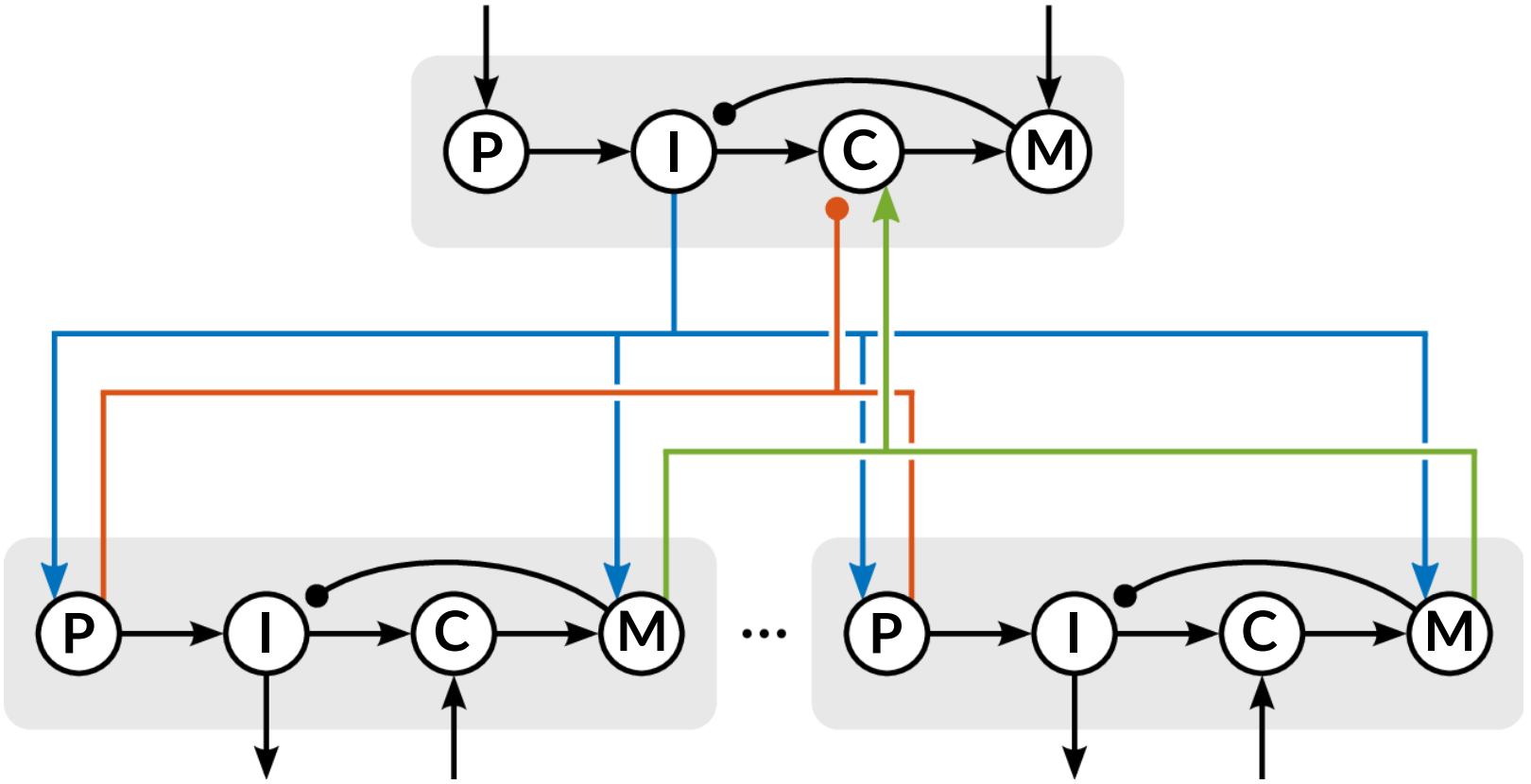


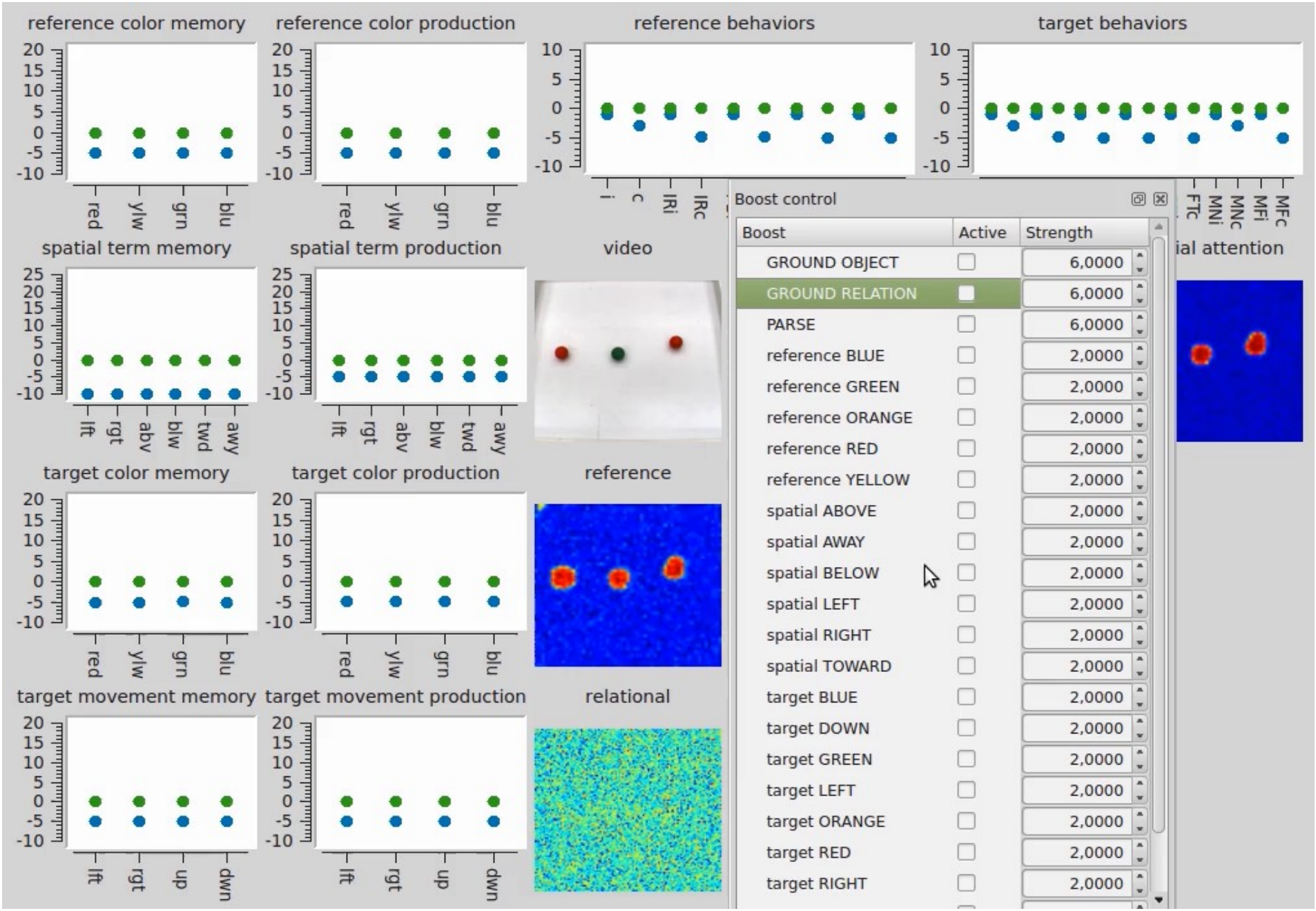
Richter, Lins, Schöner (Top Cogn Sci, 2017)

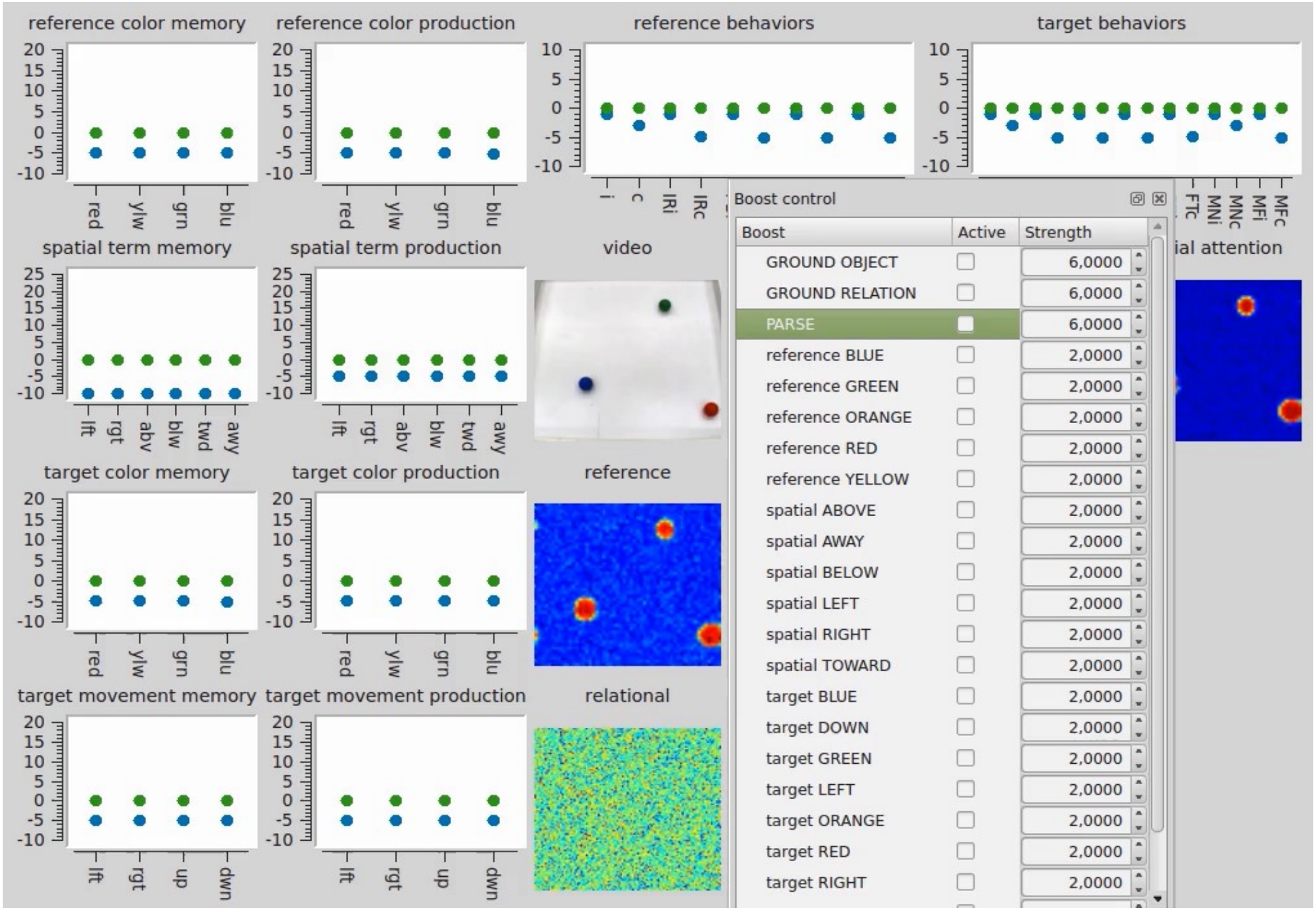
Cognitive operations and sequences



Cognitive operations and sequences




reference color memory
reference color production
reference behaviors
target behaviors
red
ylw
grn
blu
i
c
IRi
IRc
FTc
MNi
MNc
MFi
MFc
spatial term memory
spatial term production
video
lft
rgt
abv
blw
twd
awy
target color memory
target color production
reference
target movement memory
target movement production
relational
up
dwn
Boost control
Boost
Active
Strength
GROUND OBJECT
6,0000
GROUND RELATION
PARSE
reference BLUE
2,0000
reference GREEN
reference ORANGE
reference RED
reference YELLOW
spatial ABOVE
spatial AWAY
spatial BELOW
spatial LEFT
spatial RIGHT
spatial TOWARD
target BLUE
target DOWN
target GREEN
target LEFT
target ORANGE
target RED
target RIGHT


reference color memory
reference color production
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IRc
FTc
MNi
MNc
MFi
MFc
spatial term memory
spatial term production
lft
rgt
abv
blw
twd
awy
video
reference
target color memory
target color production
relational
target movement memory
target movement production
up
dwn
Boost control
Boost
Active
Strength
GROUND OBJECT 6,0000
GROUND RELATION 6,0000
PARSE 6,0000
reference BLUE 2,0000
reference GREEN 2,0000
reference ORANGE 2,0000
reference RED 2,0000
reference YELLOW 2,0000
spatial ABOVE 2,0000
spatial AWAY 2,0000
spatial BELOW 2,0000
spatial LEFT 2,0000
spatial RIGHT 2,0000
spatial TOWARD 2,0000
target BLUE 2,0000
target DOWN 2,0000
target GREEN 2,0000
target LEFT 2,0000
target ORANGE 2,0000
target RED 2,0000
target RIGHT 2,0000
ial attention