Wie das Gehirn lernt
- Das Beispiel Perzeptuelles Lernen -

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„Wie es im Gehirn zugeht“

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Perzeptuelles Lernen

... bezeichnet eine dauerhafte Veränderung von (senomotorischem) Verhalten als Folge von Erfahrung.

Perceptual Learning

Denotes a lasting change of behaviour based on experience.

Modifies detection, discrimination, or classification of sensory inputs and their relations (e.g. visuo-motor).

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Modifies detection, discrimination, or classification of sensory inputs and their relations (e.g. visuo-motor).

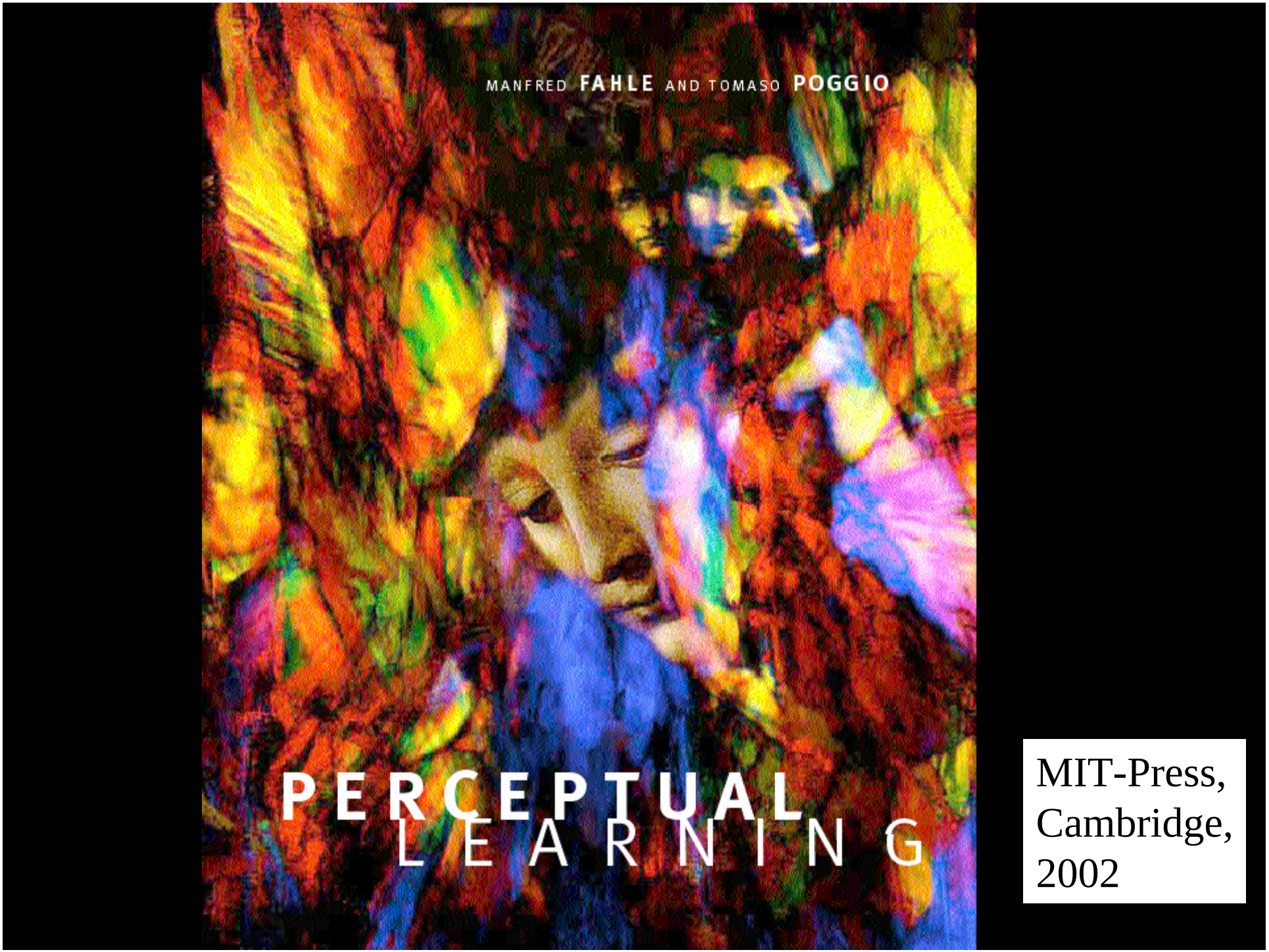
Serves to adjust sensory capabilities to task demands and to a changing world.

Ergebnisse **1 - 10** von ungefähr **217.000** für **"Perceptual learning"**. (**0,06** Sekunden)

Books: **Perceptual Learning** - [Diese Seite übersetzen]**Perceptual learning** is the specific and relatively permanent modification **...** The final sections offer general models of **perceptual learning** and discuss the **...**
cognet.mit.edu/library/books/view?isbn=0262062216 - 34k - Im Cache - Ähnliche Seiten

[PDF] **PERCEPTUAL LEARNING**Dateiformat: PDF/Adobe Acrobat - HTML-Version
Four mechanisms of **perceptual learning** are discussed: attention **...** The field of **perceptual learning** has changed significantly since the last Annual **...**
cognitrn.psych.indiana.edu/rgoldsto/pdfs/perlearn.pdf - Ähnliche Seiten

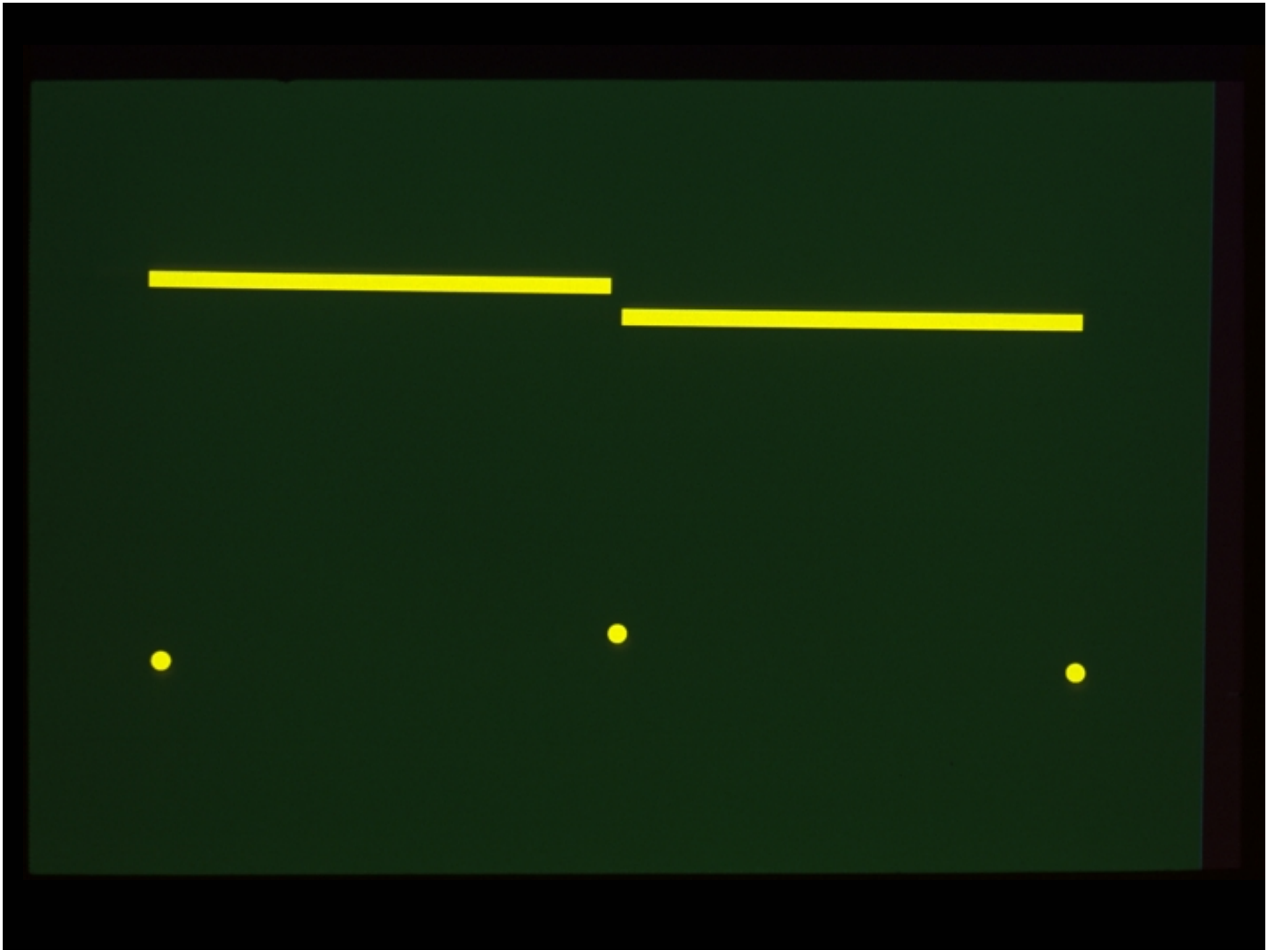
perceptual learning -- Encyclopædia Britannica - [Diese Seite übersetzen]
perceptual learning the effects of past experience on sensory perceptions.
www.britannica.com/eb/article-9059188 - 36k - Im Cache - Ähnliche Seiten

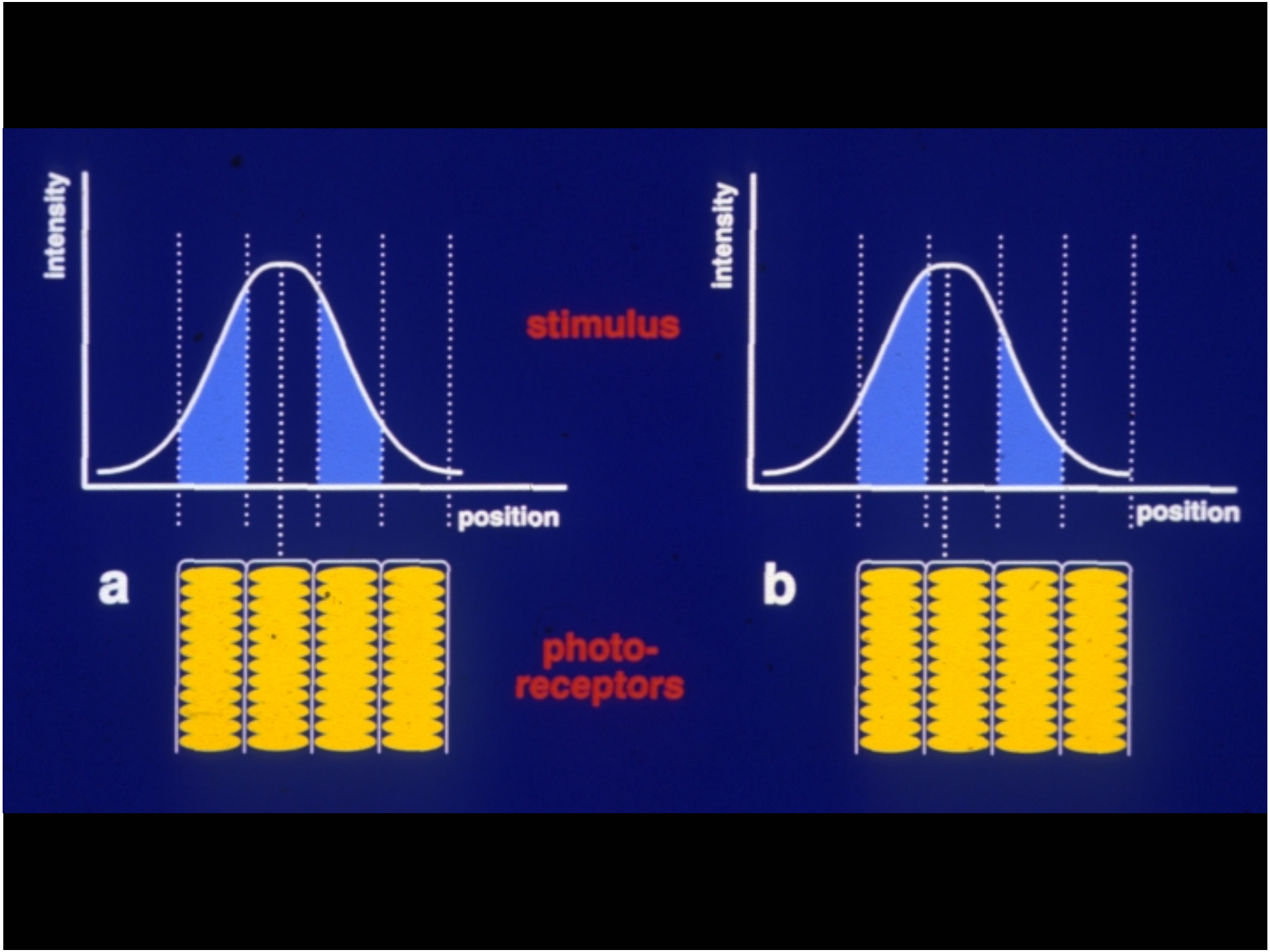


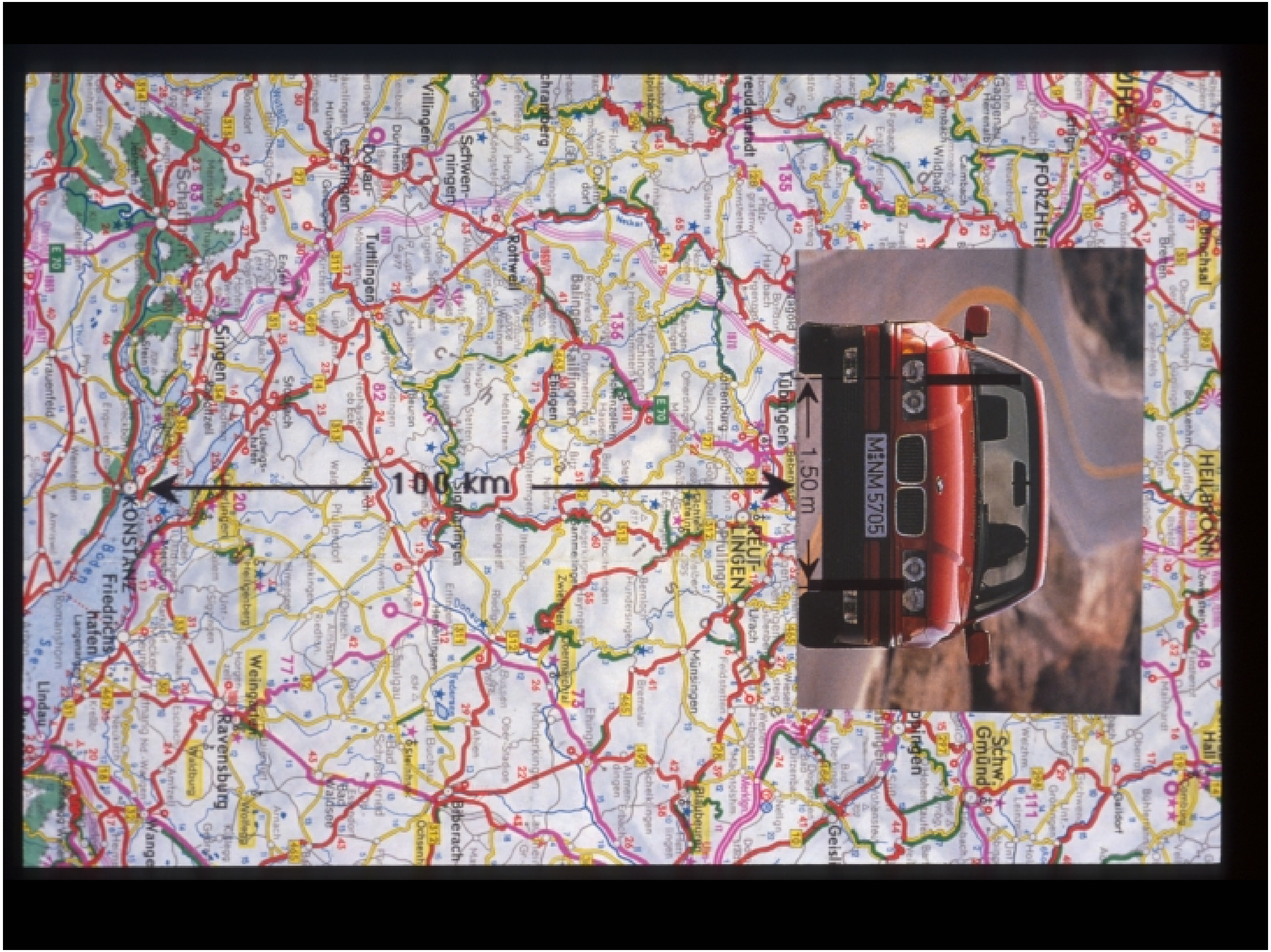
MIT-Press, Cambridge, 2002

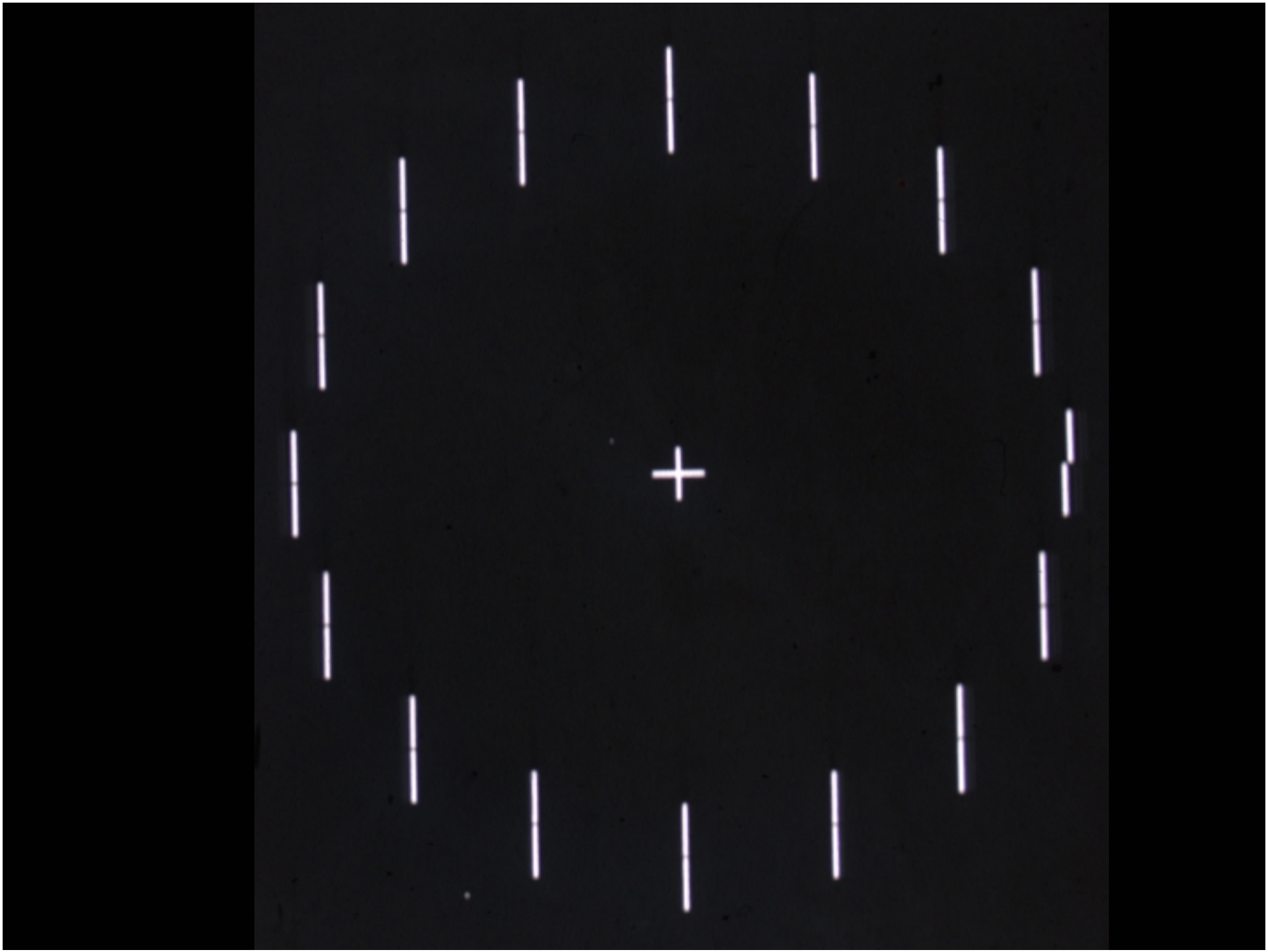
"It turns out that the human visual system incorporates a permanent or 'hard-wired' table of similarities..."
D.H. Marr, Vision (1982), p. 185

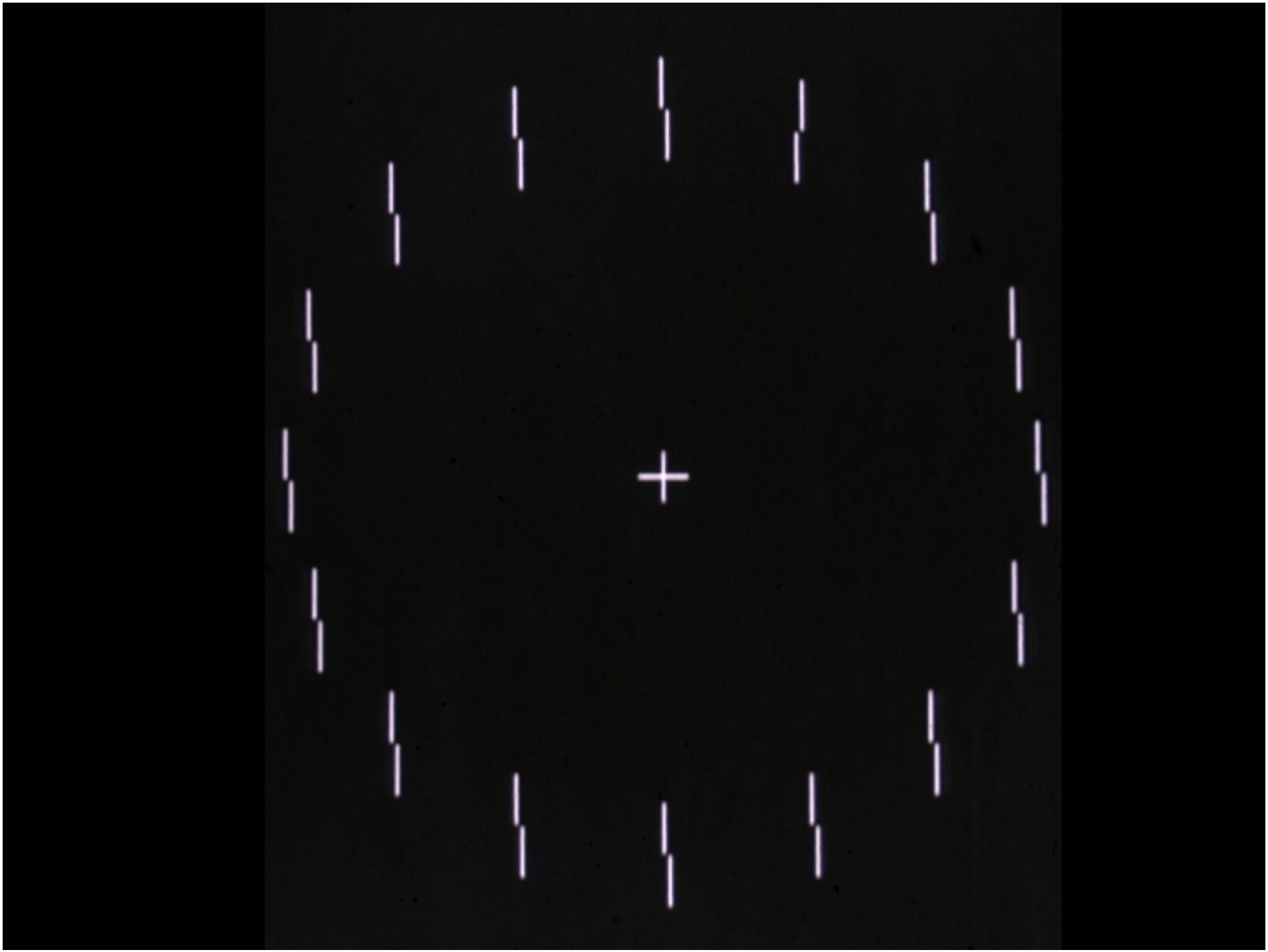
"...neural connections present early in life can be modified by visual experience. Such neural plasticity was not observed in the adult..."
T.W. Wiesel, Nature (1982), p. 583

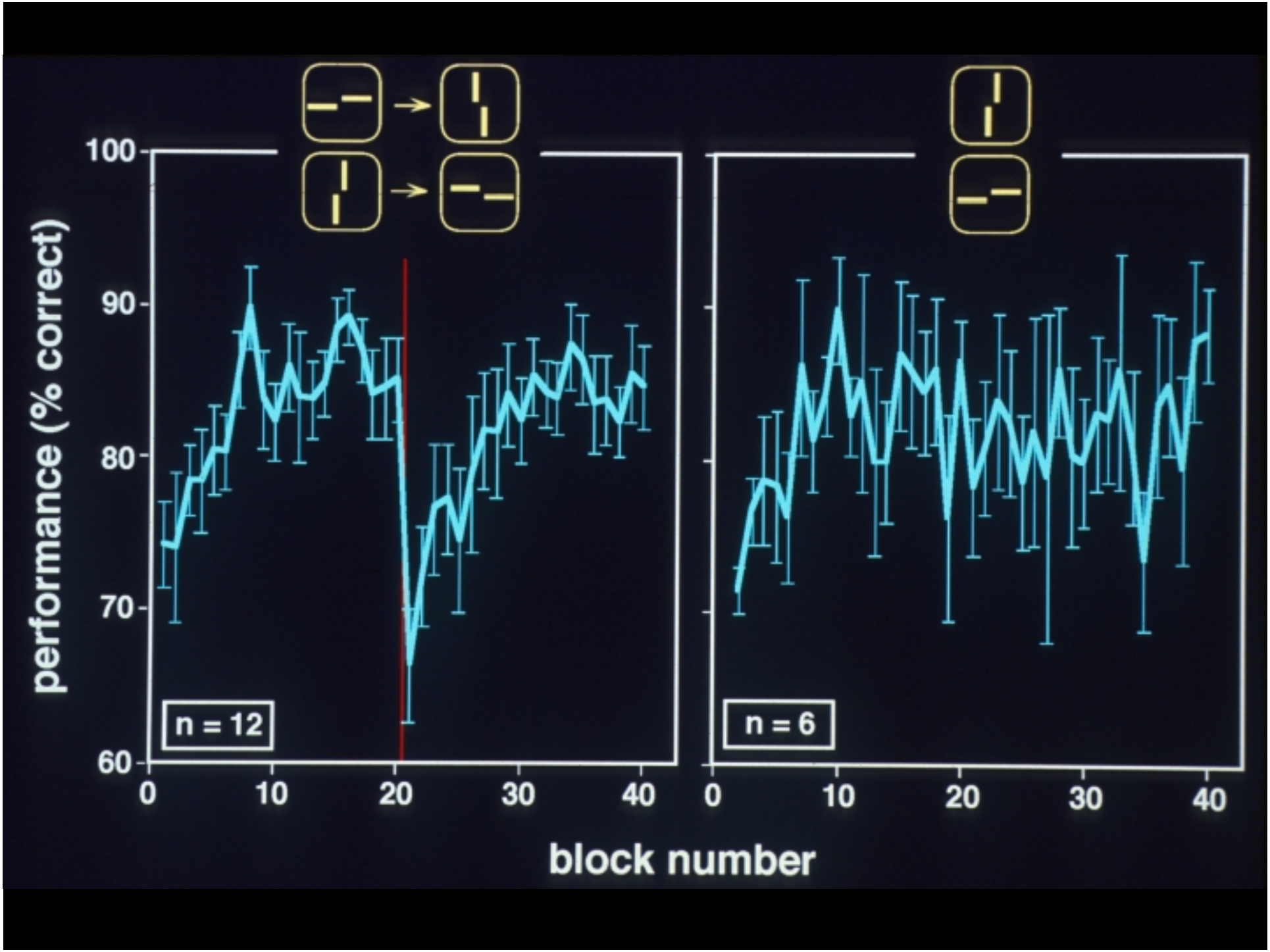


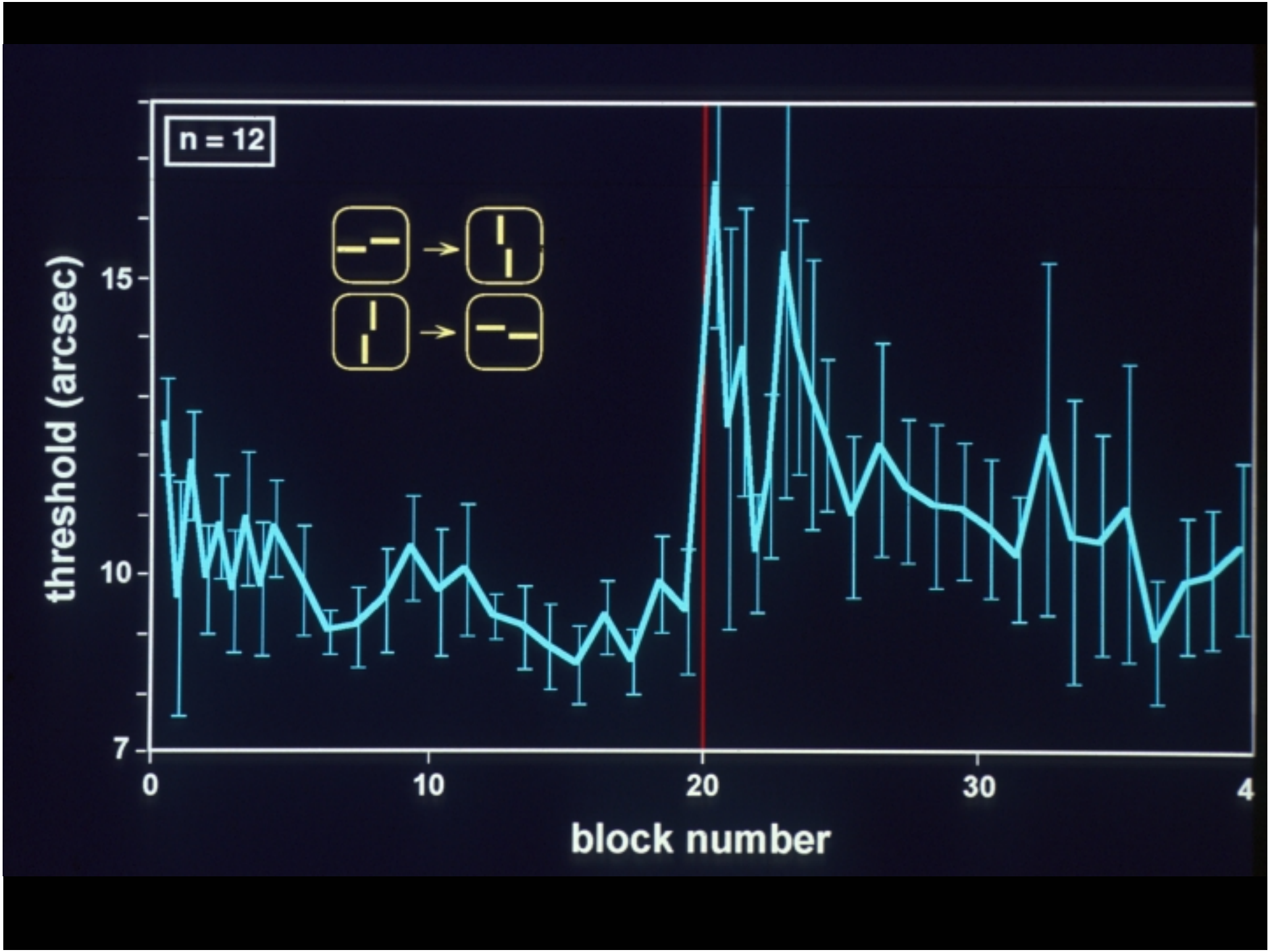

intensity
position
stimulus
intensity
position
a
b
photo-
receptors


100 km
1.50 m
M·NM 5705



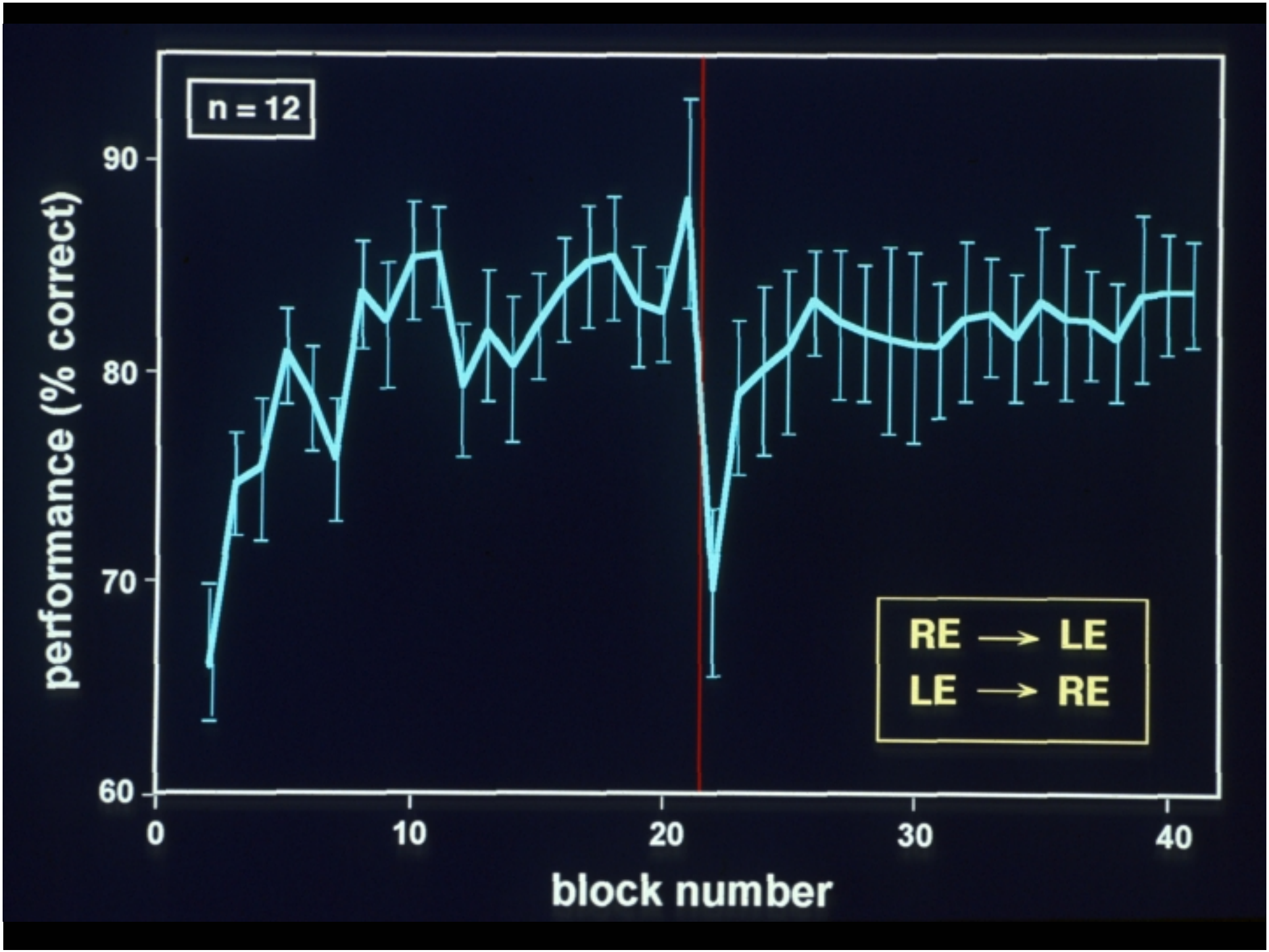


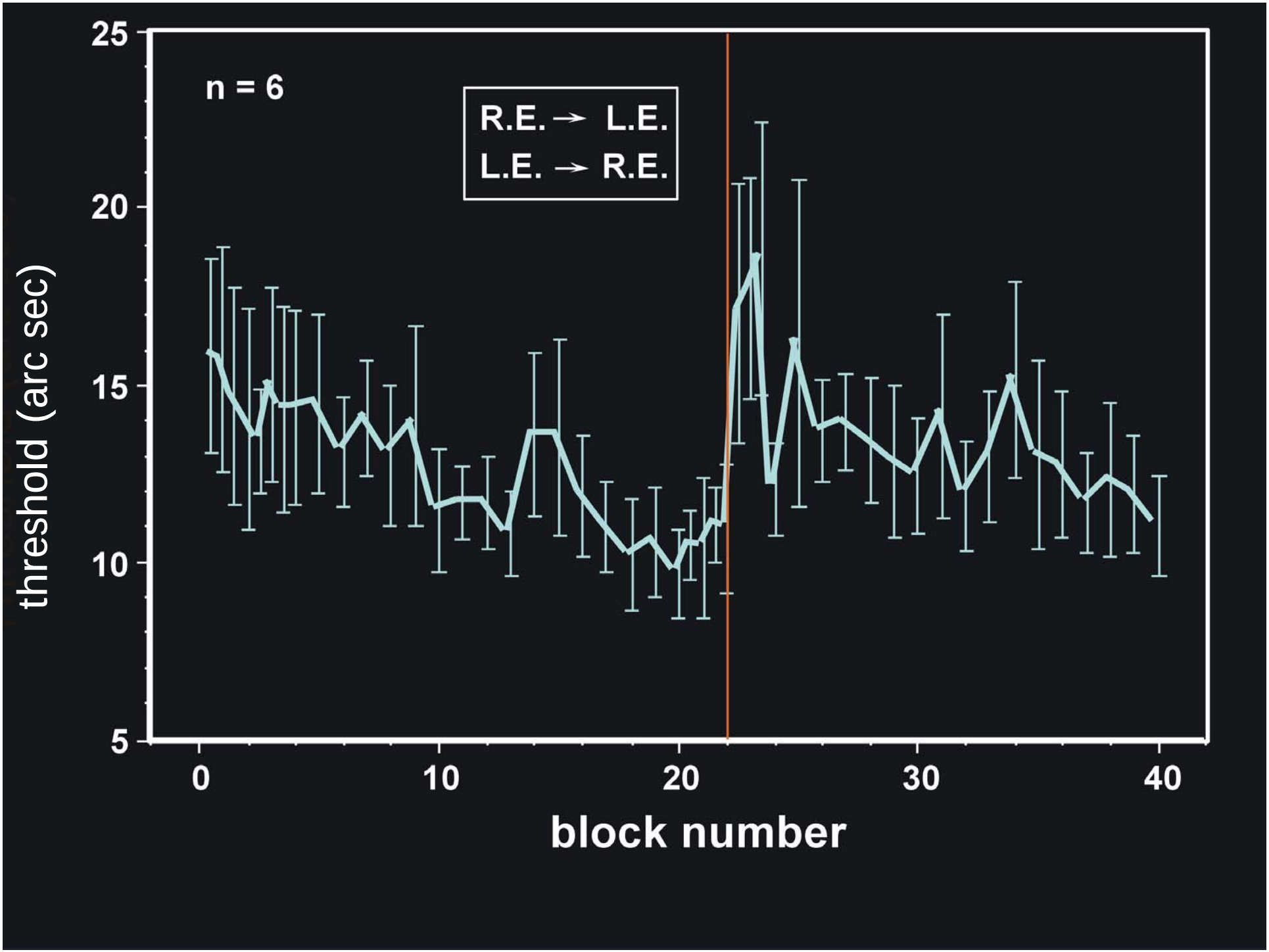

100
90
80
70
60
performance (% correct)
n = 12
n = 6
0
10
20
30
40
0
10
20
30
40
block number

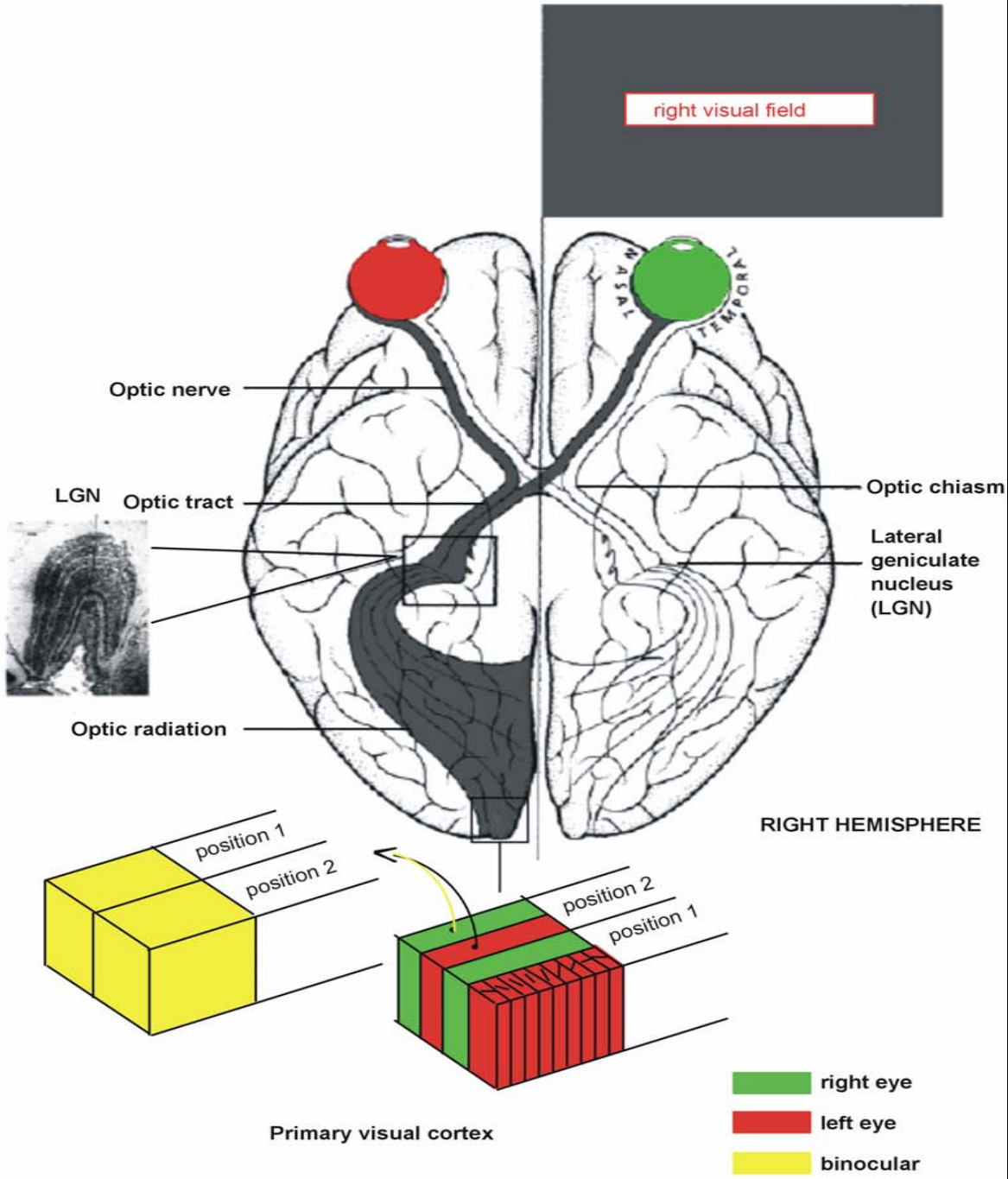

n = 12
threshold (arcsec)
15
10
7
0
10
20
30
4
block number

Perceptual learning is specific for stimulus orientation.

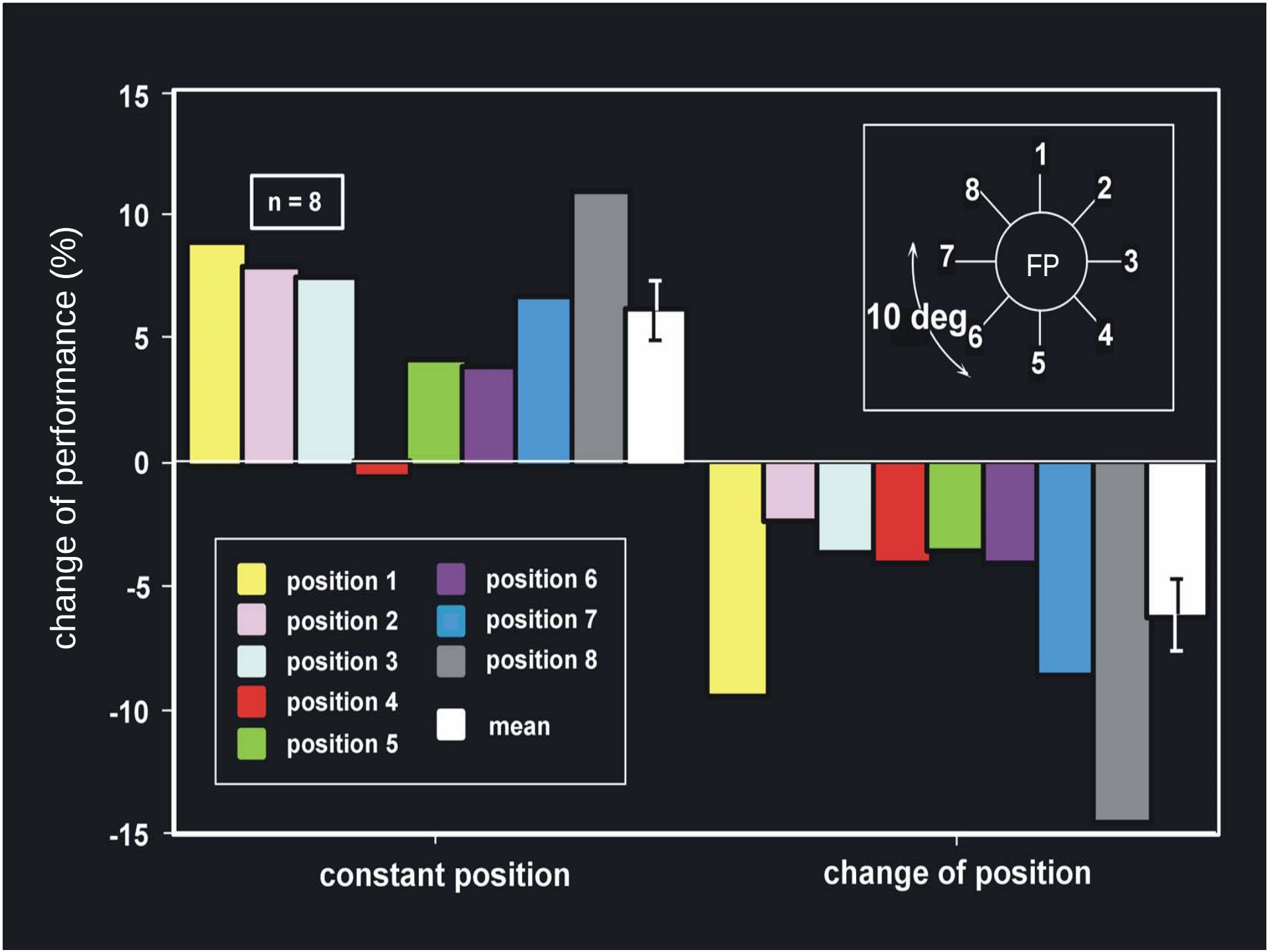
There is a fast and a slow phase of learning.


n = 12
performance (% correct)
90
80
70
60
0
10
20
30
40
block number
RE → LE
LE → RE


n = 6
R.E. → L.E.
L.E. → R.E.
threshold (arc sec)
25
20
15
10
5
0
10
20
30
40
block number

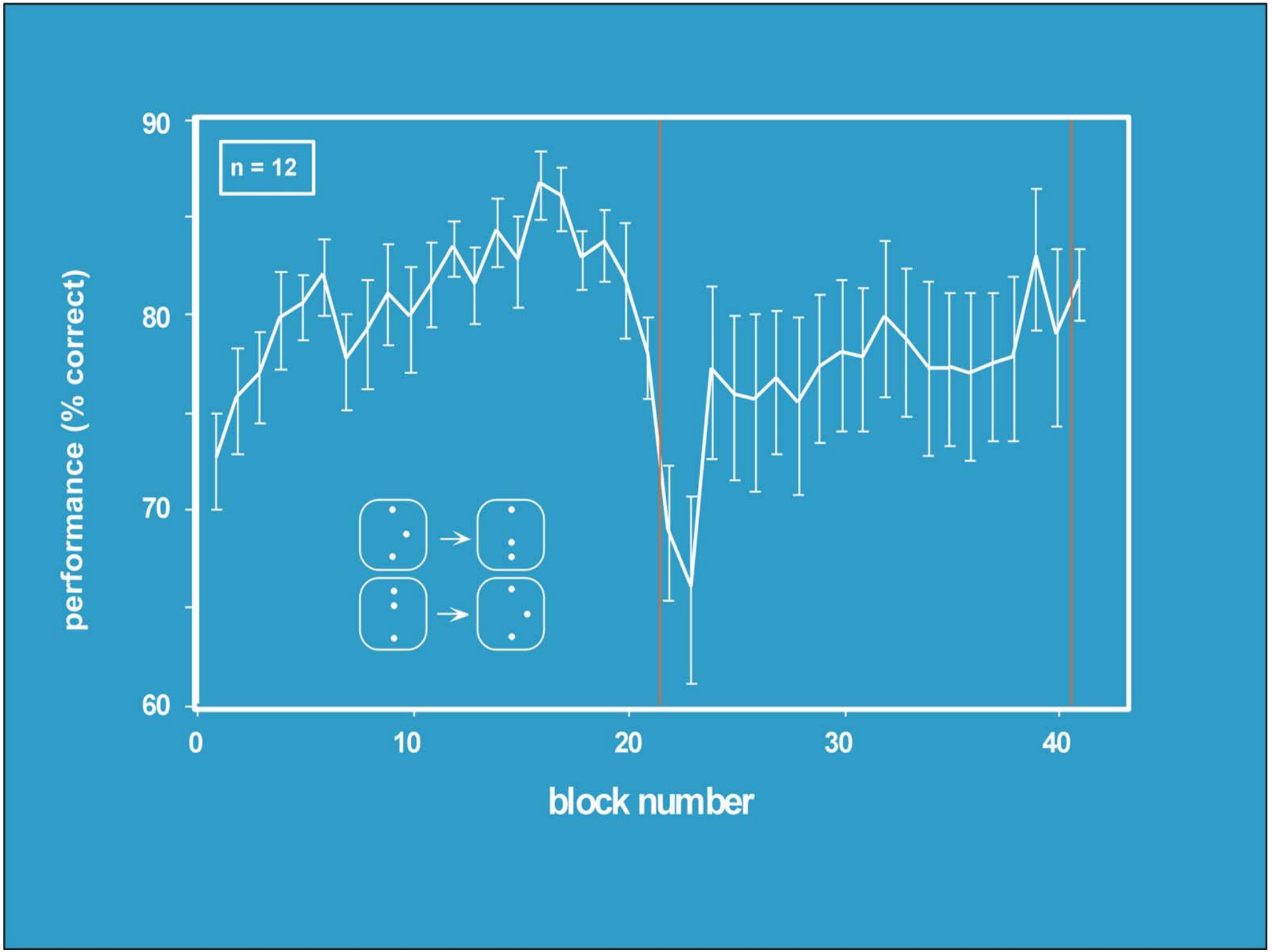

right visual field
NASAL
TEMPORAL
Optic nerve
LGN
Optic tract
Optic chiasm
Lateral geniculate nucleus (LGN)
Optic radiation
RIGHT HEMISPHERE
position 1
position 2
position 2
position 1
right eye
left eye
binocular
Primary visual cortex

Perceptual learning is (partly) specific for the eye trained, hence probably takes place at the primary visual cortex

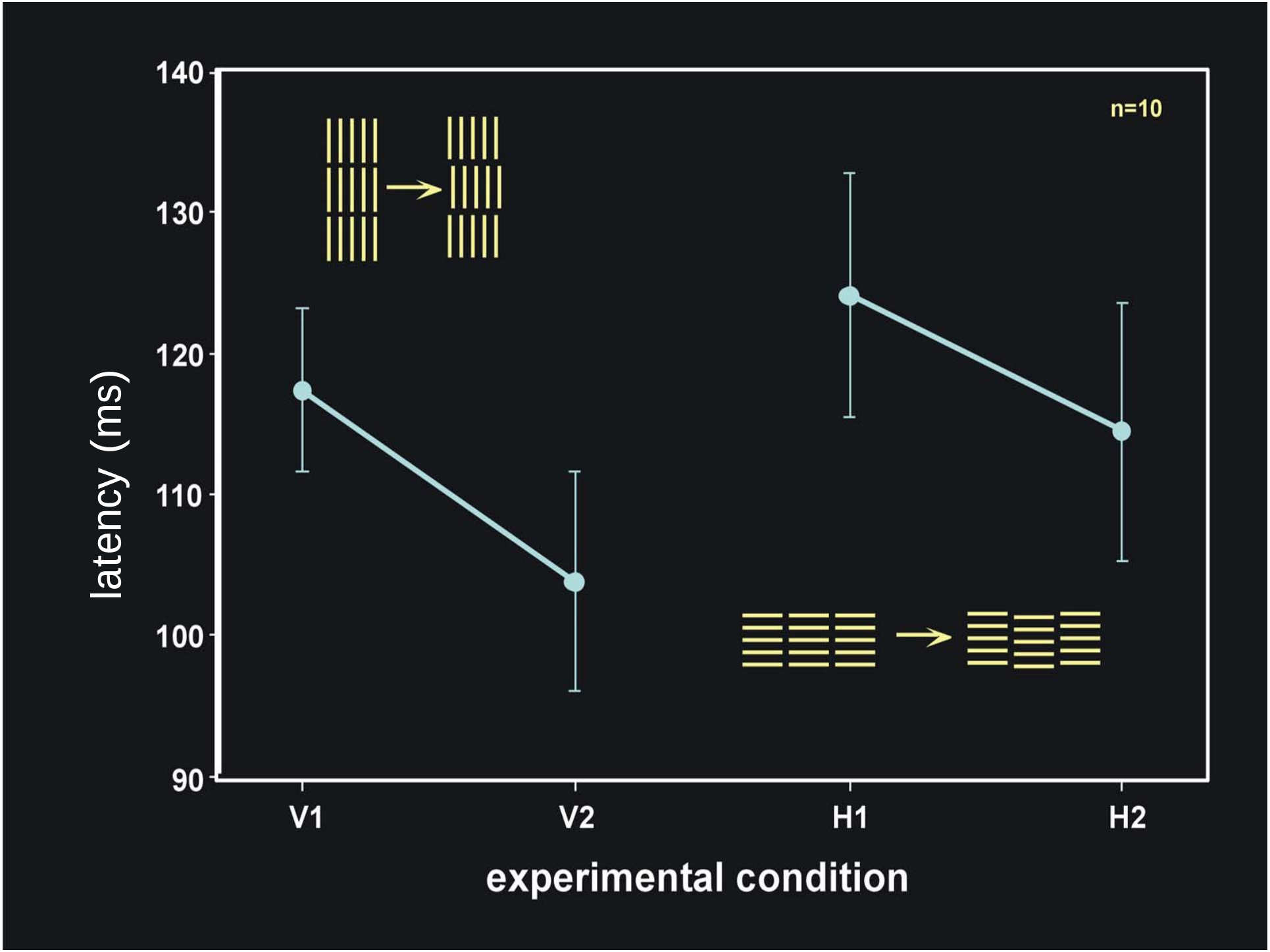

15
10
5
0
-5
-10
-15
change of performance (%)
n = 8
position 1
position 2
position 3
position 4
position 5
position 6
position 7
position 8
mean
1
2
3
4
5
6
7
8
FP
10 deg
constant position
change of position

Perceptual learning is specific for stimulus position.

Shimon Edelman

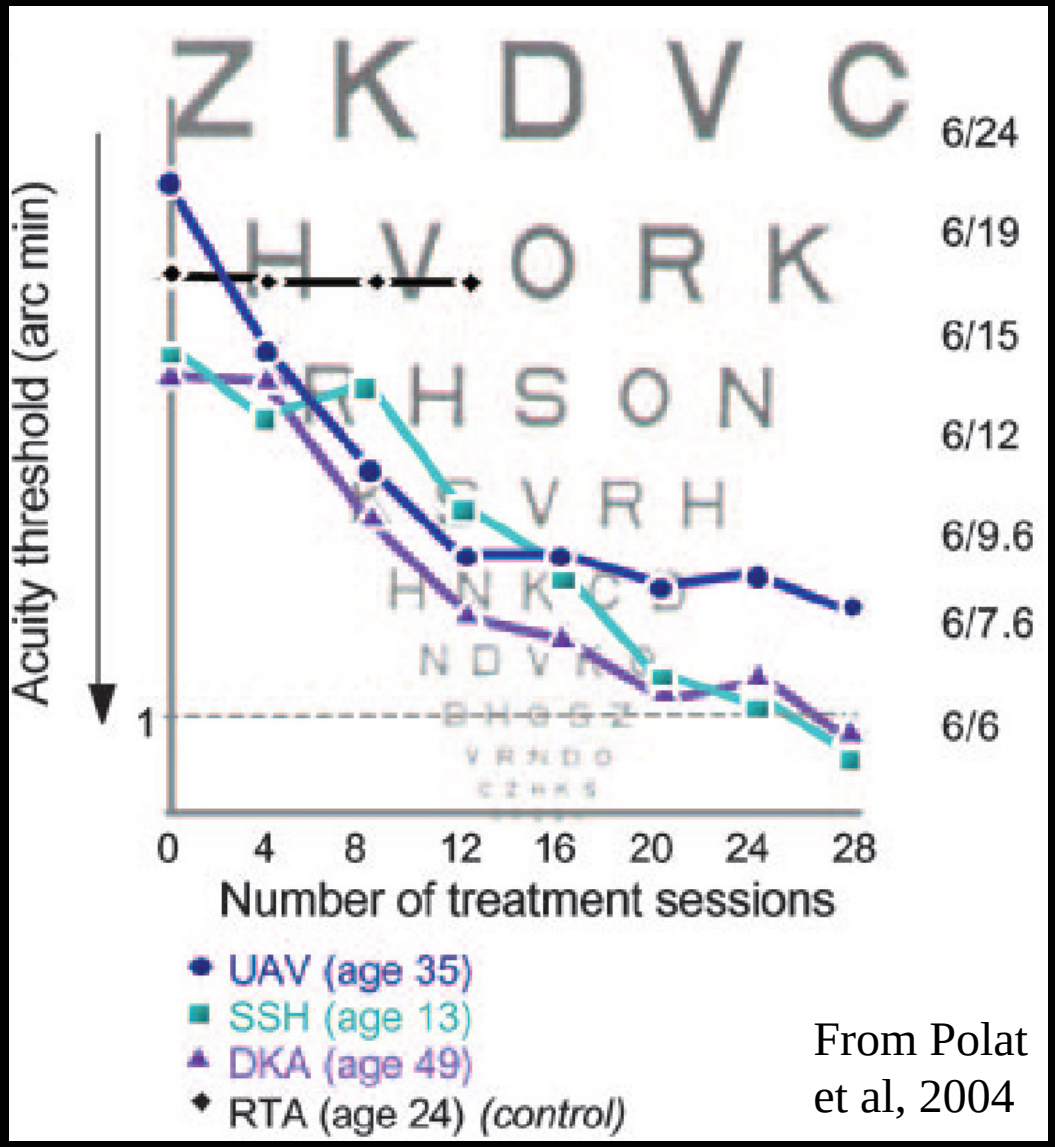

n = 12
performance (% correct)
90
80
70
60
0
10
20
30
40
block number

Perceptual learning is specific for the exact task, and due to sensory rather than motor improvement.


140
130
120
110
100
90
latency (ms)
n=10
V1
V2
H1
H2
experimental condition

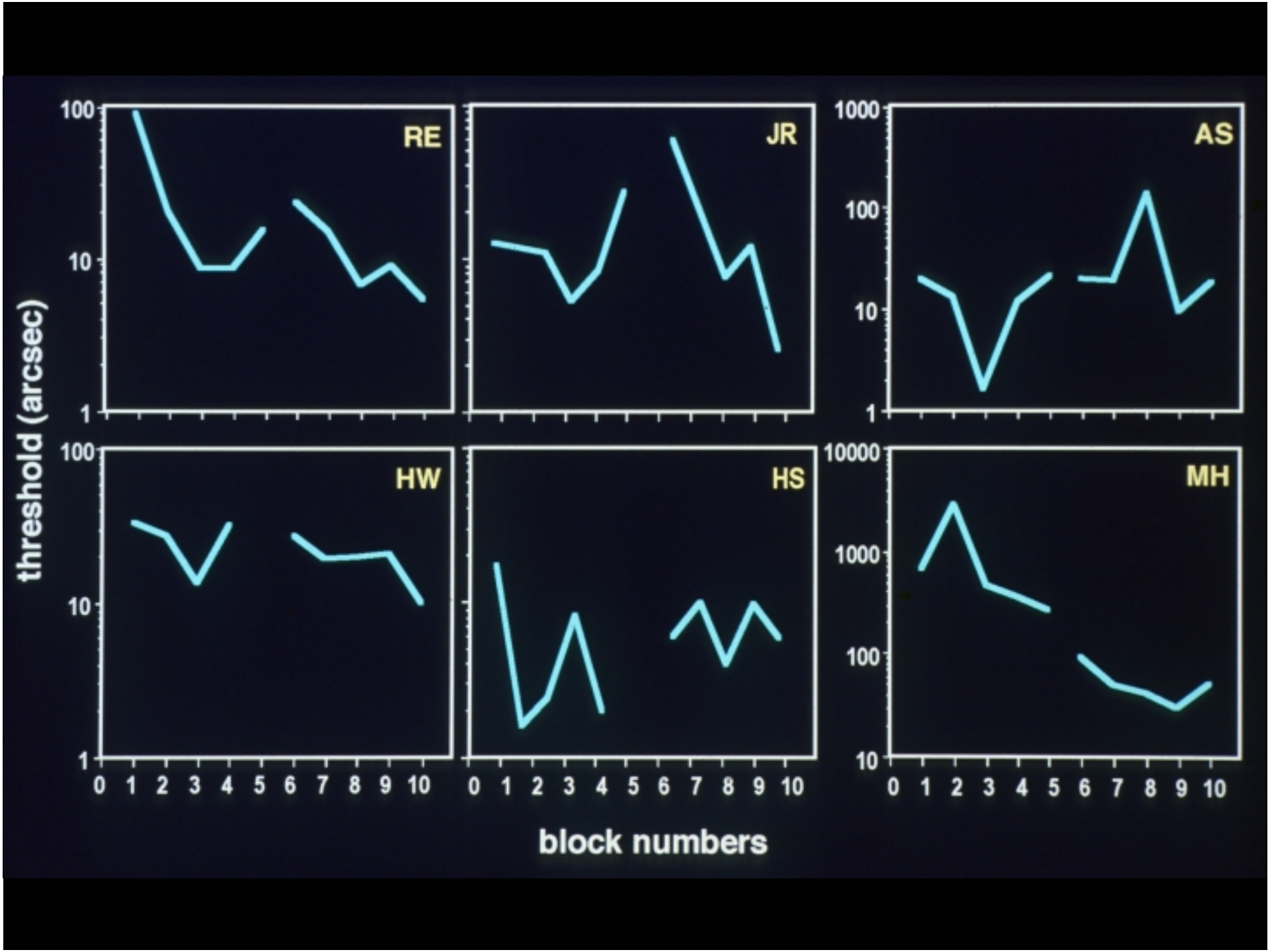
There is an electrophysiological correlate of perceptual learning.

Wolfgang Skrandies



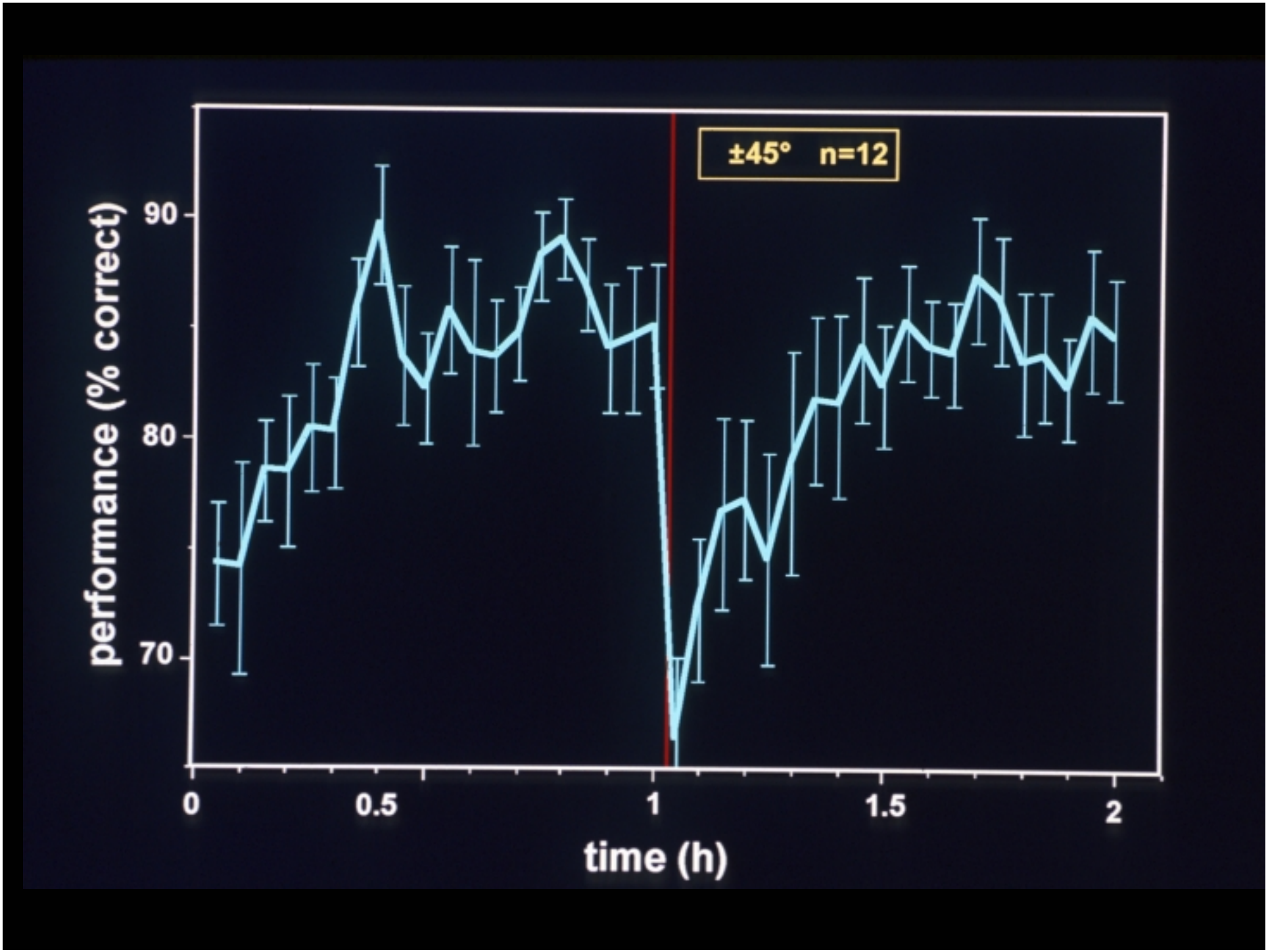
From Polat et al, 2004

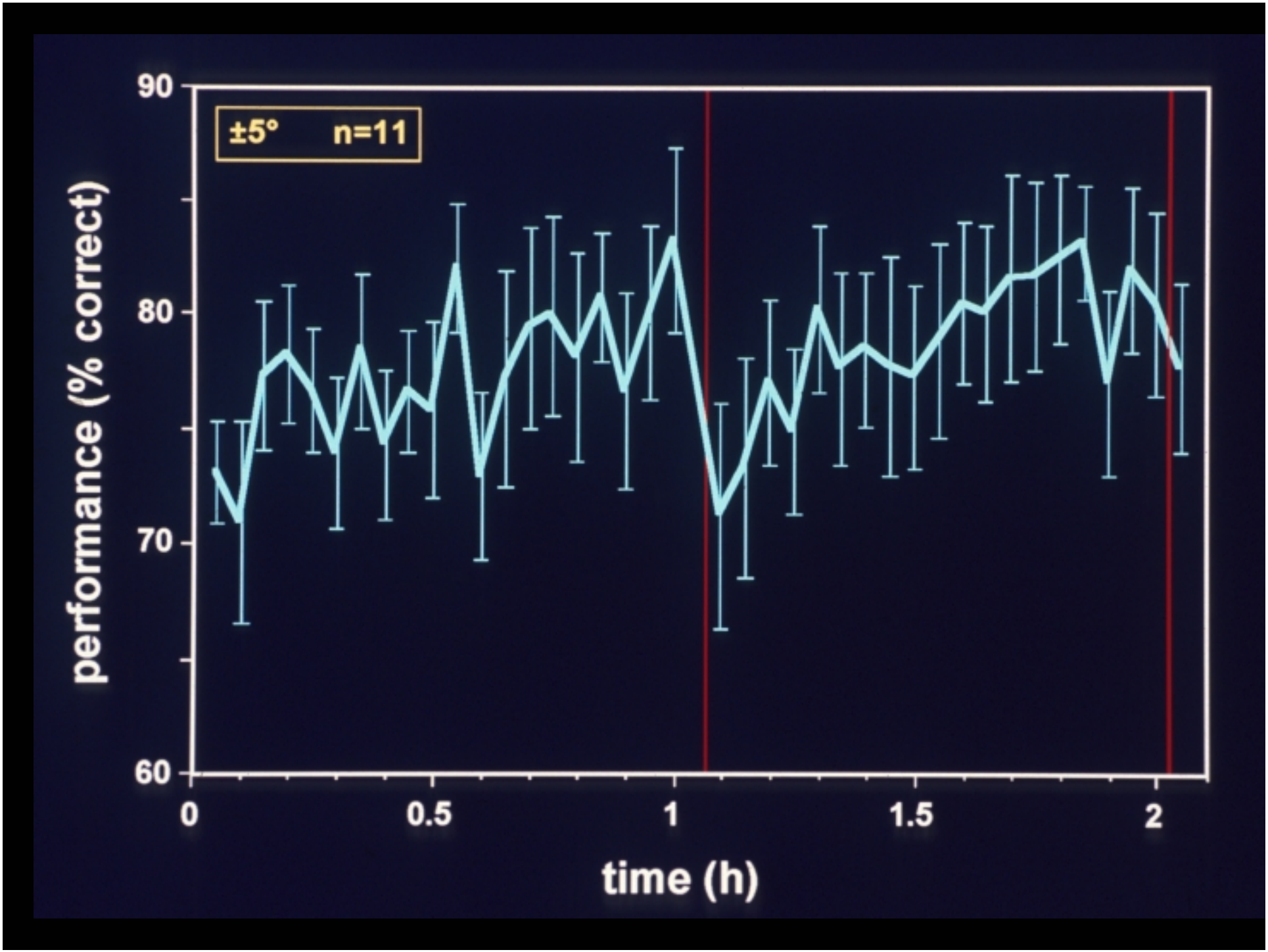
Even the adult primary visual cortex shows "plasticity".

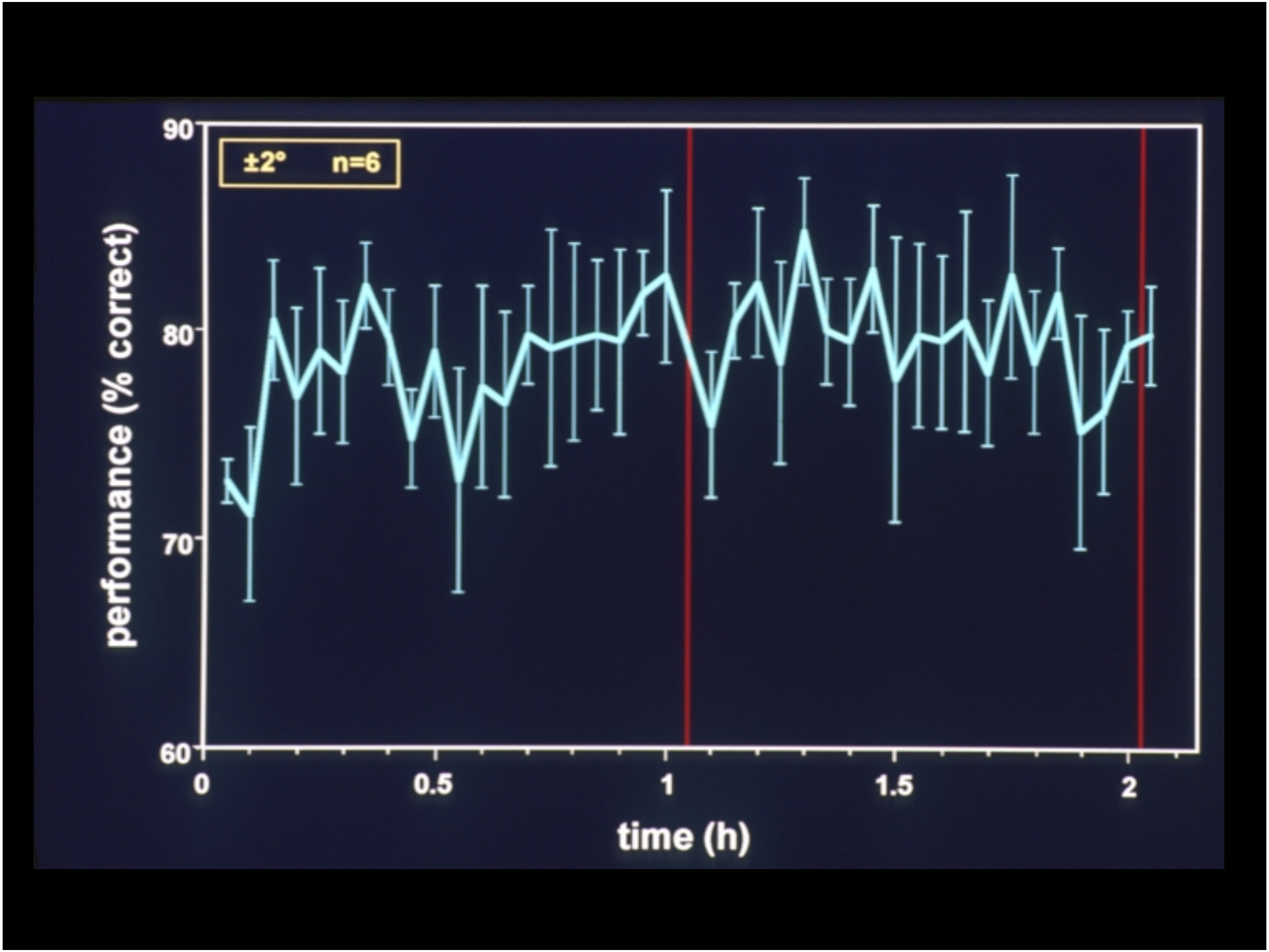

RE
JR
AS
HW
HS
MH
threshold (arcsec)
block numbers
100
10
1
1000
10000
0 1 2 3 4 5 6 7 8 9 10

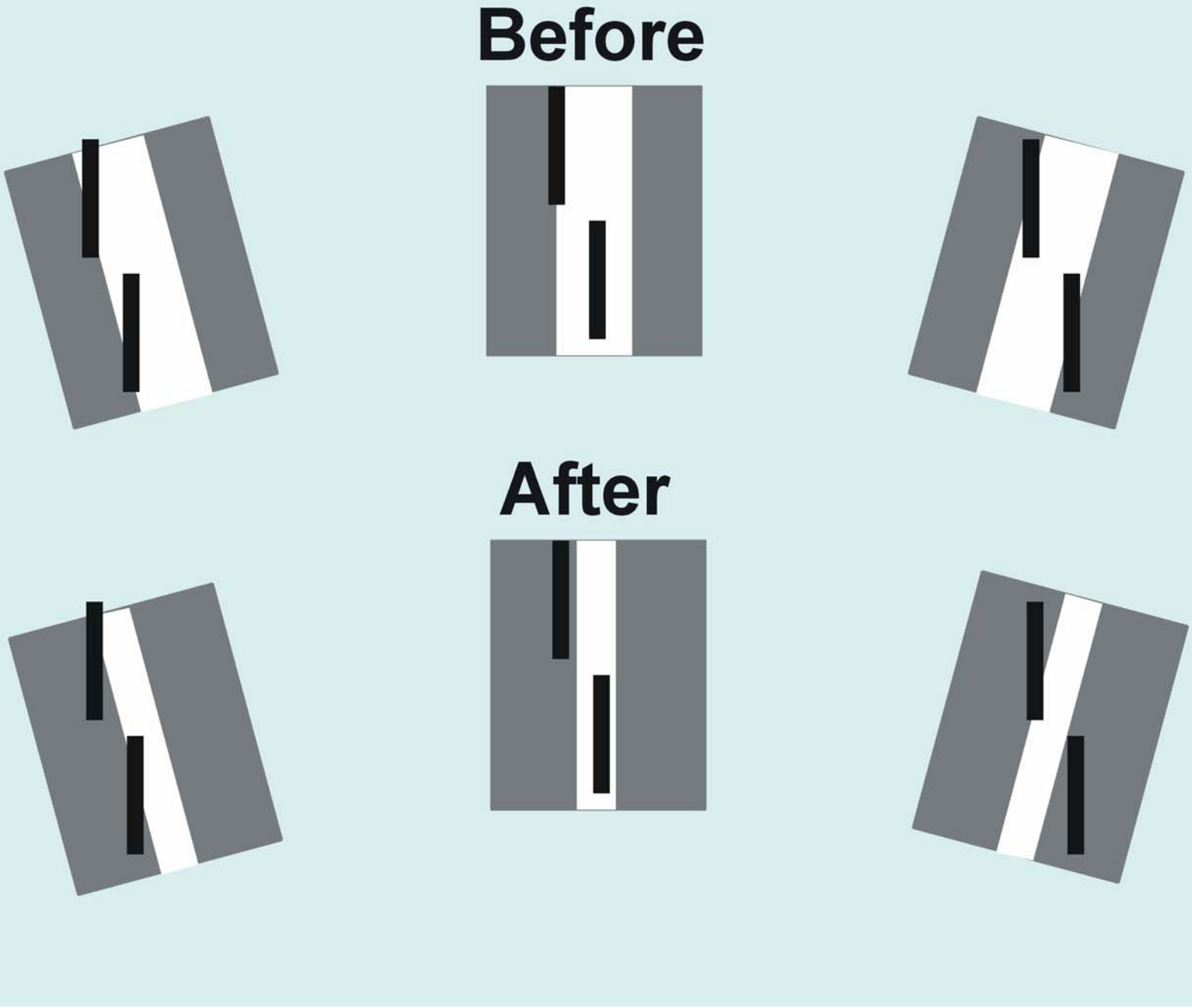
Even patients suffering from amnestic syndromes improve.

Irene Daum


±45° n=12
performance (% correct)
90
80
70
0
0.5
1
1.5
2
time (h)


±5° n=11
90
80
70
60
performance (% correct)
0
0.5
1
1.5
2
time (h)


±2°
n=6
90
80
70
60
performance (% correct)
0
0.5
1
1.5
2
time (h)


Before
After

Improvement is not due just to sharpening of orientation sensitive units, but has to incorporate top-down influences.

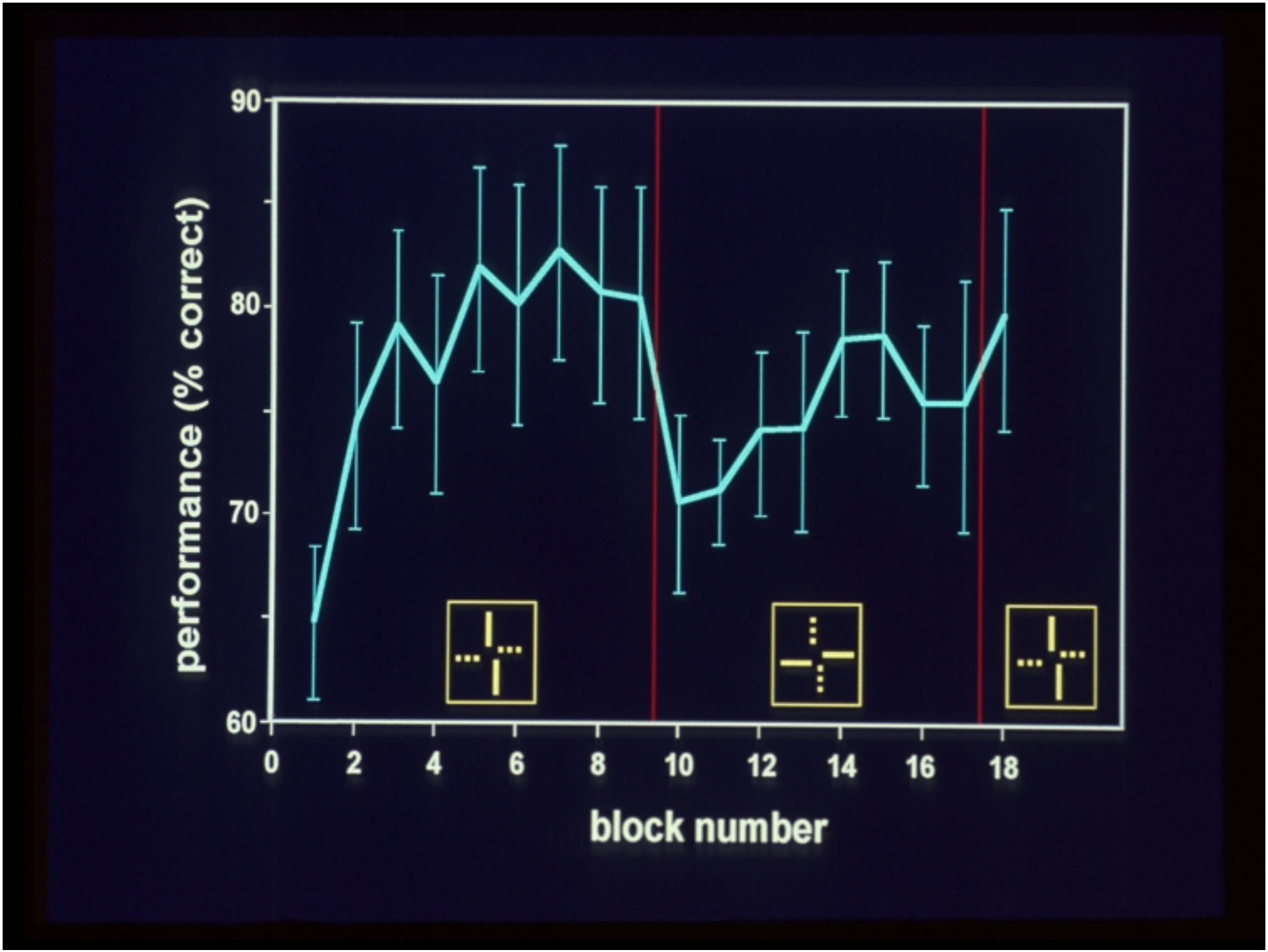
Difficulties in modeling perceptual learning

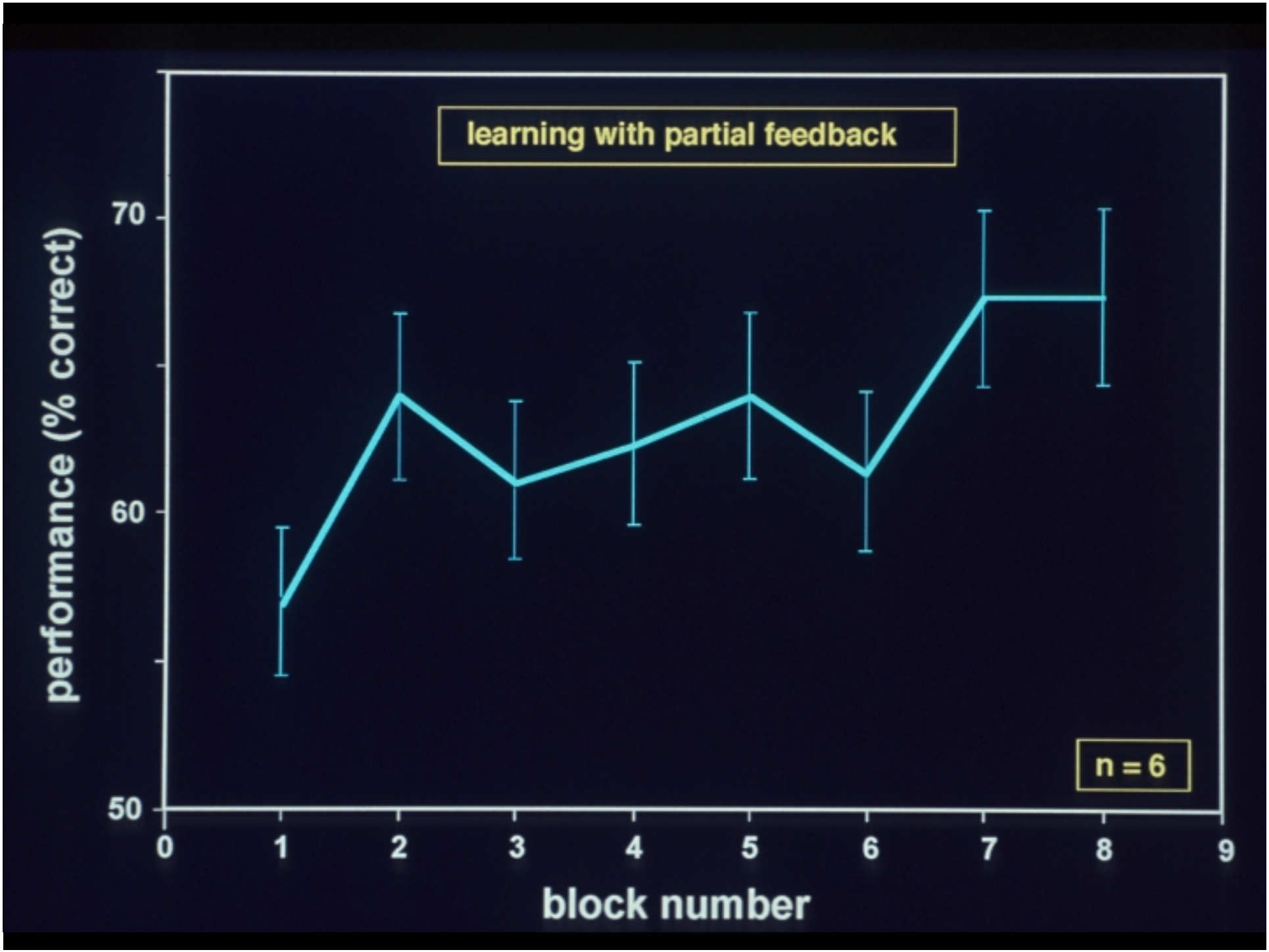
Problems:

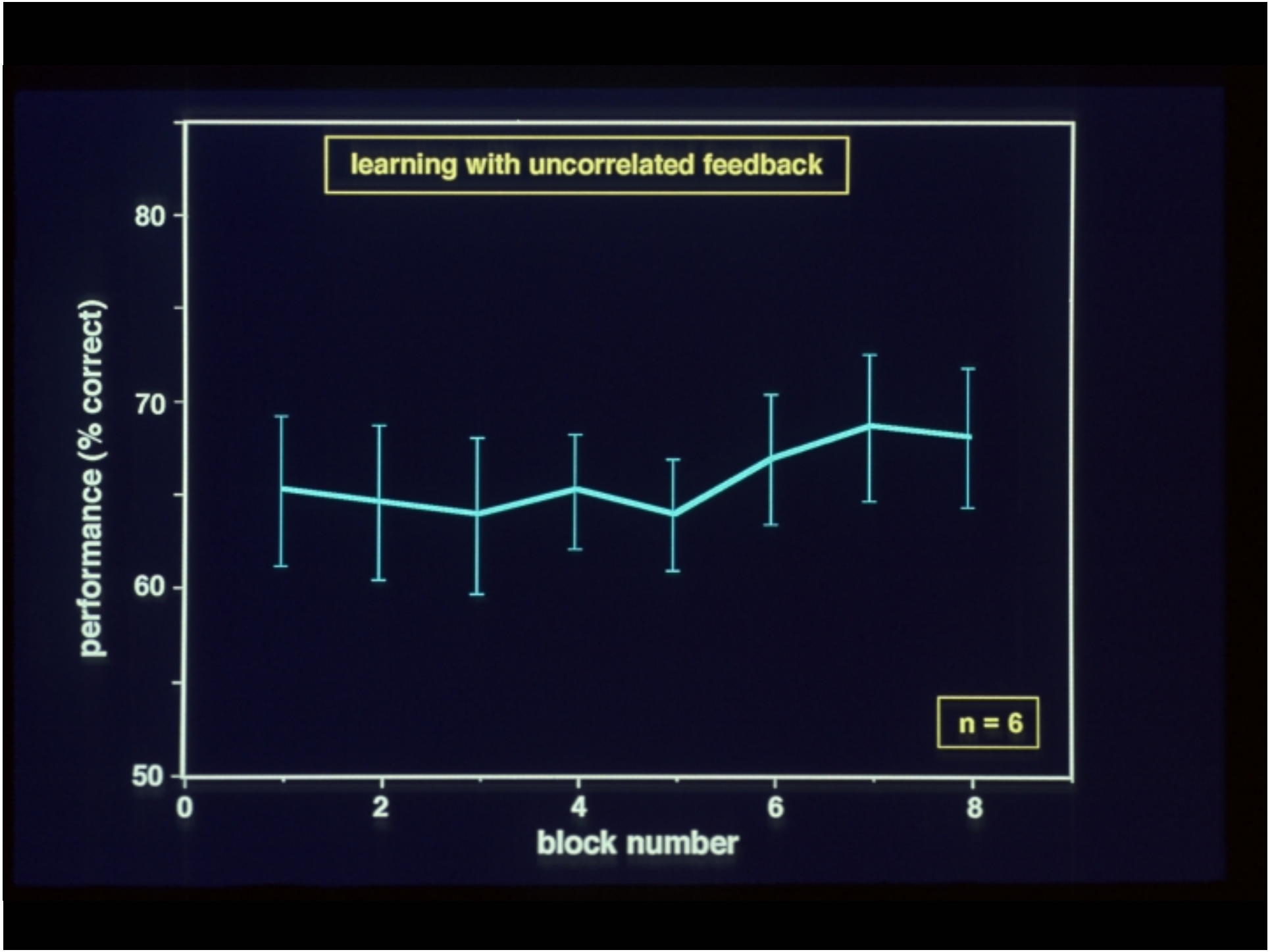
1. Selection of weights
2. Interference
3. Selection of the task

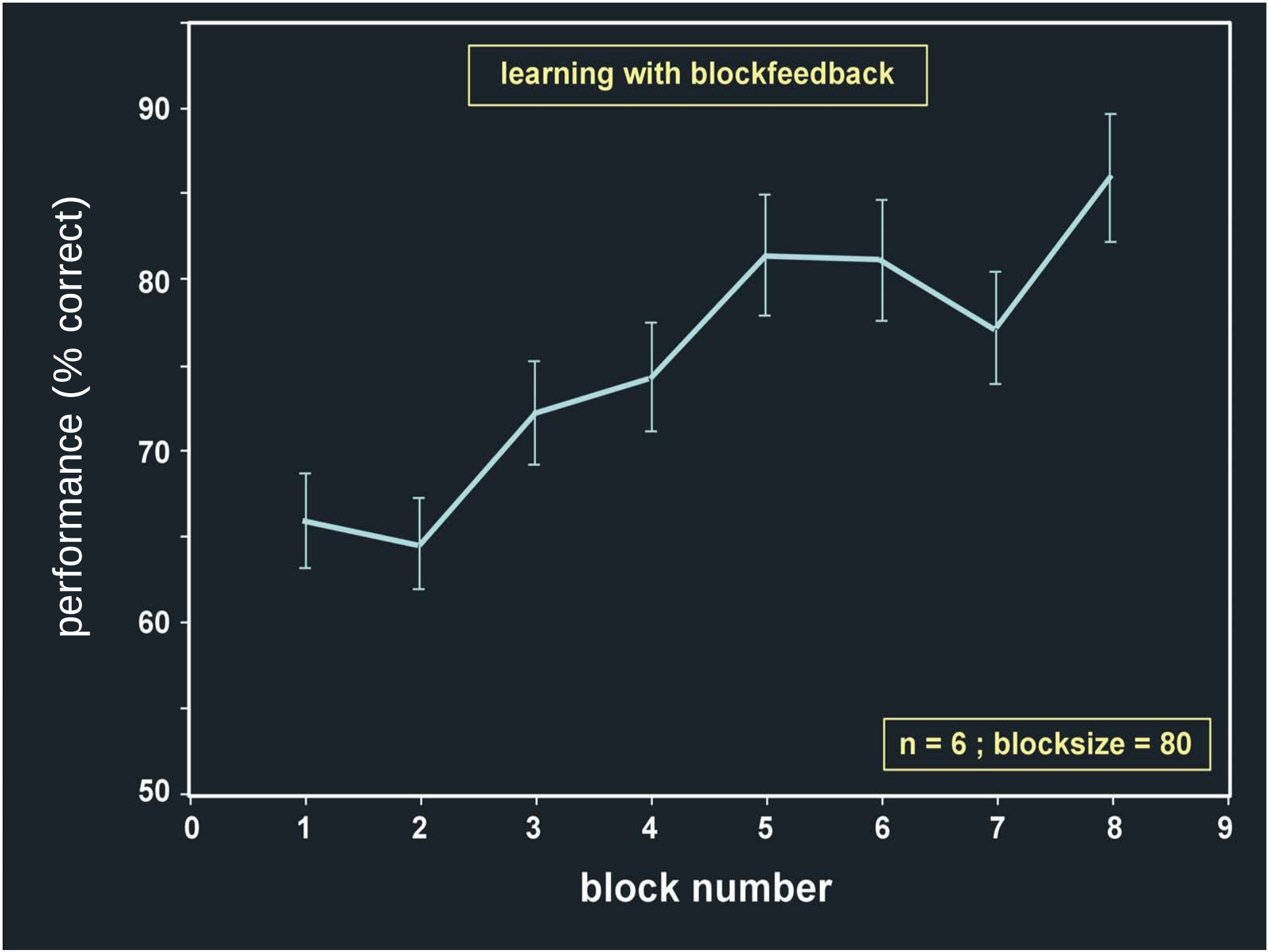
$\binom{9}{3} = 84$

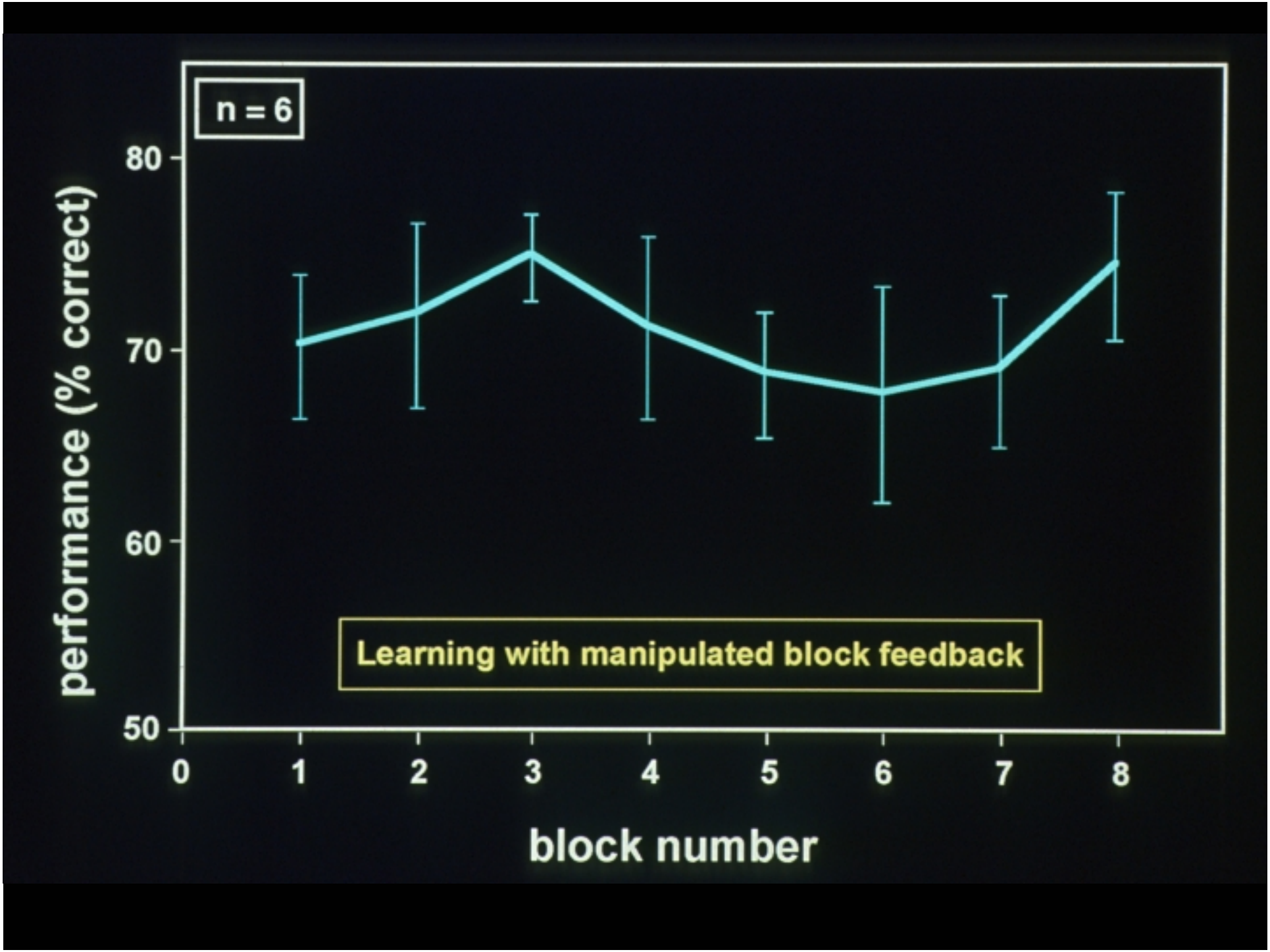
3-Point tasks


90
80
70
60
performance (% correct)
0
2
4
6
8
10
12
14
16
18
block number

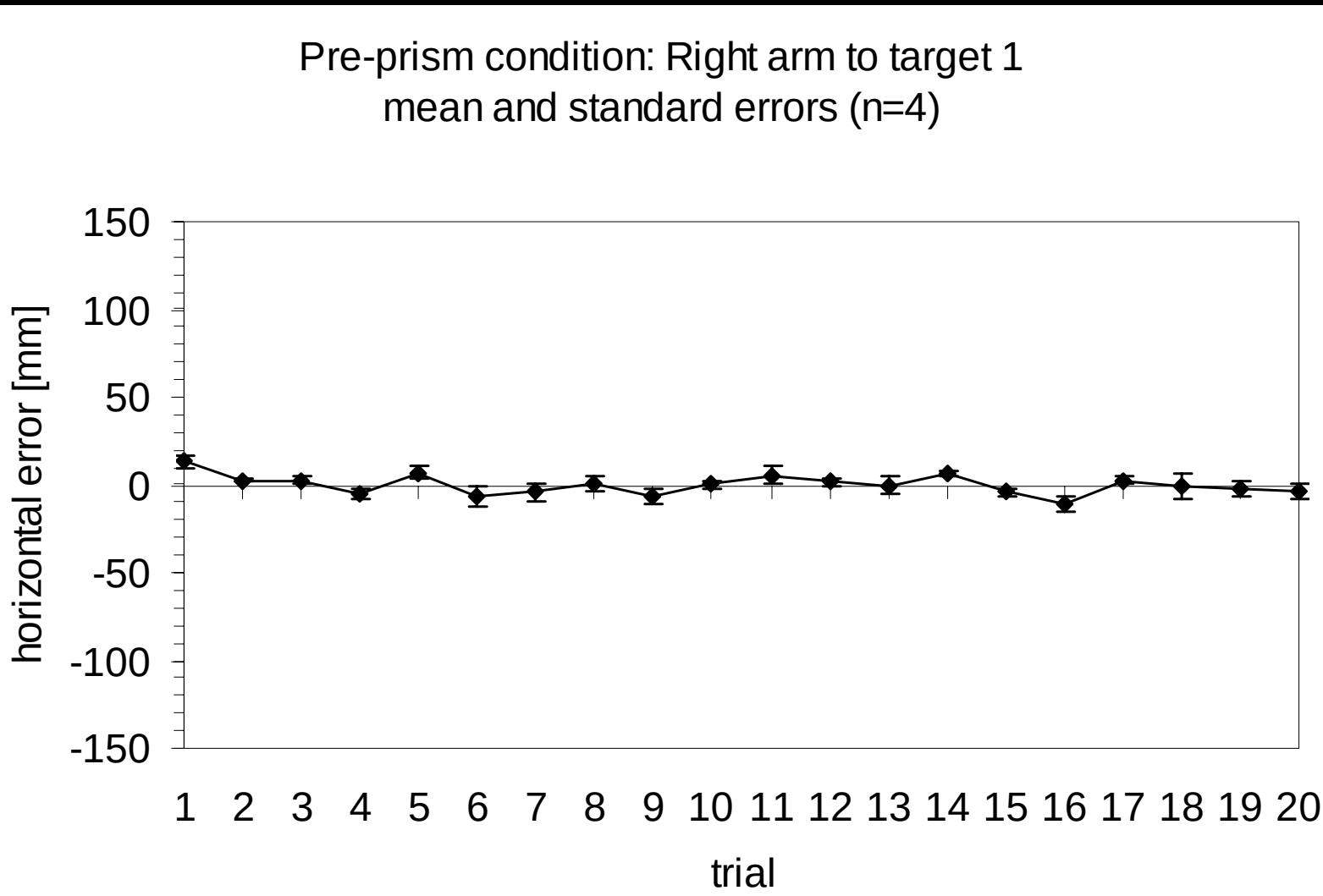

learning with partial feedback
performance (% correct)
70
60
50
0
1
2
3
4
5
6
7
8
9
block number
n = 6


learning with uncorrelated feedback
performance (% correct)
80
70
60
50
0
2
4
6
8
block number
n = 6

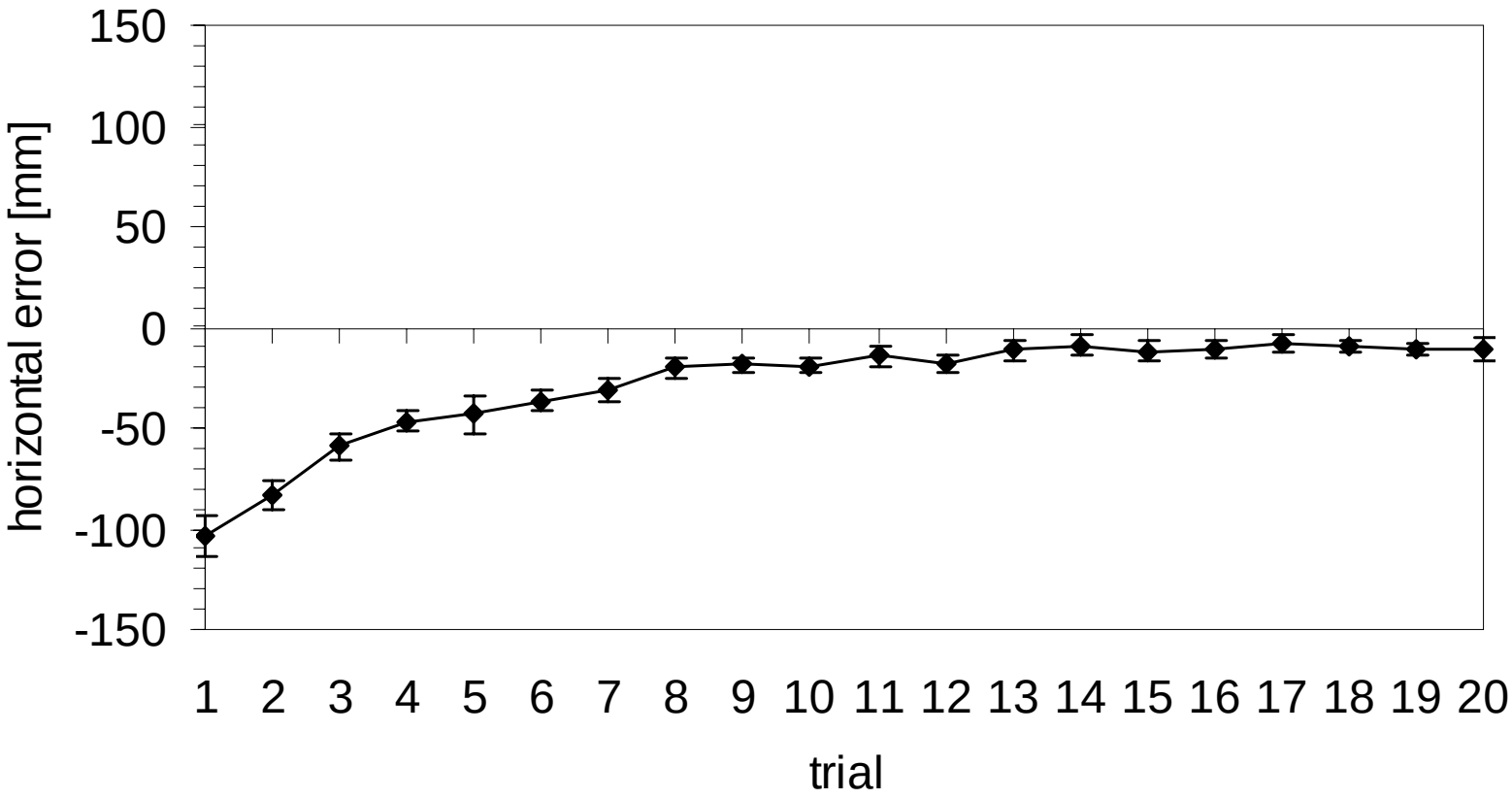

learning with blockfeedback
performance (% correct)
90
80
70
60
50
0
1
2
3
4
5
6
7
8
9
block number
n = 6 ; blocksize = 80


n = 6
80
70
60
50
performance (% correct)
Learning with manipulated block feedback
0
1
2
3
4
5
6
7
8
block number

Feedback increases or decreases speed of learning but does not serve as a teacher signal, contrary to predictions of neural networks

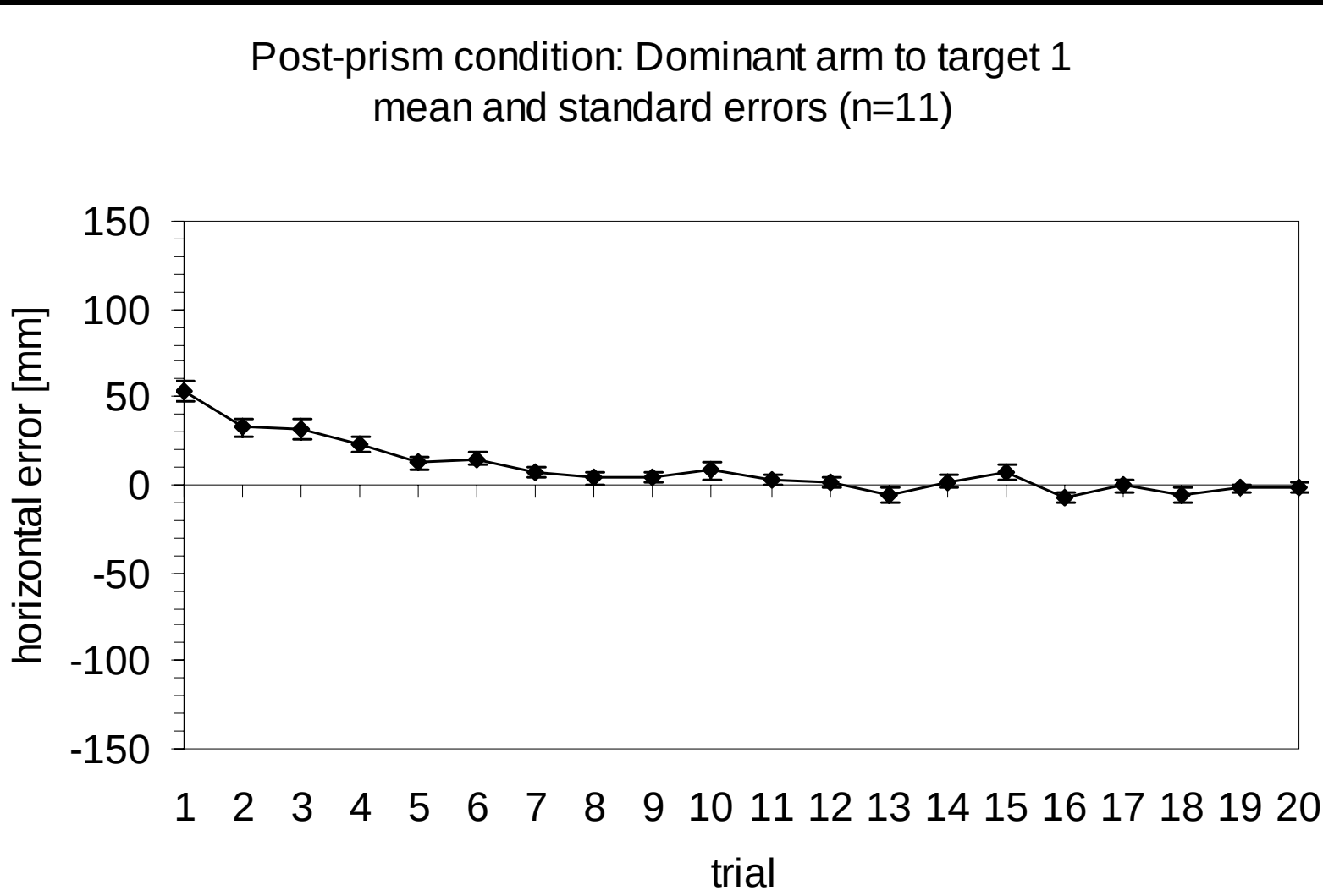


Subjects: 3 female, 1 male, all right-handed



Subjects: 9 female, 2 male

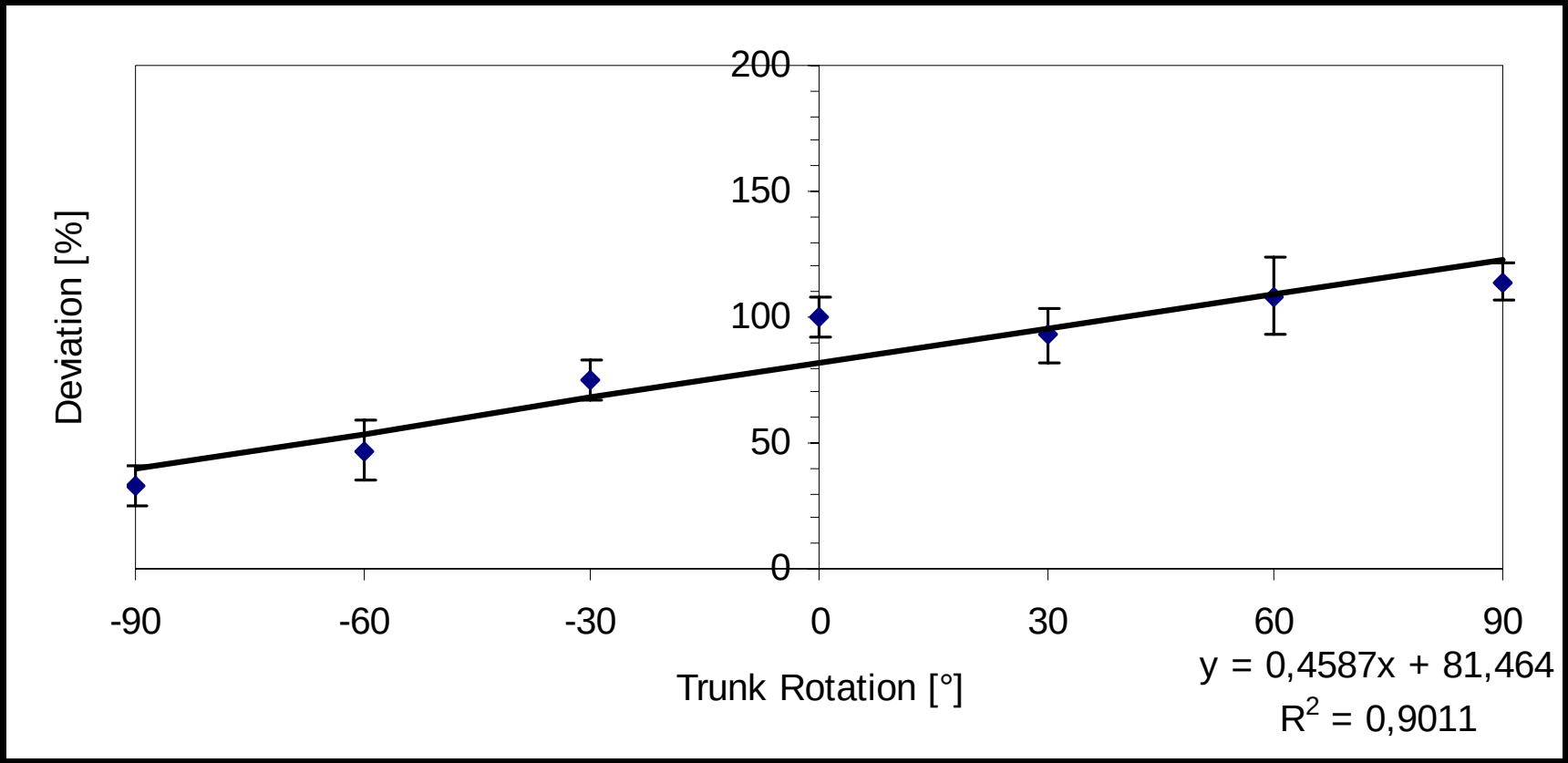
9 right-handed, 2 left-handed



Subjects: 9 female, 2 male

9 right-handed, 2 left-handed

Experiment 1: Size of After-effect after Trunk Rotation relative to the Size of the After-effect without Rotation



Subjects: 10 female, 2 male

All right-handed

Trunk rotation in the direction of the after-effect increases this after-effect, trunk rotation in the opposite direction decreases the after-effect

Summary

- The size of the prism after-effect depends on head-trunk position
- The prism after-effect is due to a recalibration of senso-motor coordination

Conclusions

- Hyperacuity is a very sensitive measure of performance and PL

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- Attention and error-feedback both exert (top-down) influence
- There are electrophysiological correlates of PL

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- Hyperacuity is a very sensitive measure of performance and PL
- Improvement through PL is specific for: orientation/ exact task/ field position/ eye trained
- Even amnesic and amblyopic patients improve
- Attention and error-feedback both have an influence
- There are electrophysiological correlates of PL
- PL involves early sensory cortices under top-down control, e.g. in learned categorical perception